ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Vol. 10. No. 17. WEEKLY. | NEW YORK, SATURDAY, JUNE 25, 1887. | $3 per annum. Single Copies, 6 Cents.

Copyright, 1887, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

Bell Telephone Case.

ARGUMENT HEARD ON THE DEMURRER OF THE COMPANY.

In the United States Circuit Court, District of Massachusetts, in Boston, on Monday last, before Judge Colt and District Judge Nelson, the case of the United States *vs.* the American Bell Telephone Company came up for argument on the demurrer of the Telephone Company. The principal causes for demurrer, as appear from the pleadings, are :

1. The bill is multifarious, in that it joins allegations for relief in respect of patent No. 174,465, dated March 7, 1876, and allegations and prayers for relief in respect of patent No. 186,787, dated January 30, 1877.

2. The bill does not point out and specify which of the persons, patents, and publications referred to in its several schedules anticipate each of the inventions claimed in the said two patents respectively nor in the several claims of each, it appearing by said schedule that some of the patents and publications therein referred to are subsequent in date to both the said patents granted to Bell. To so much of said bill as refers and relates to patent 174,465, dated March 7, 1876, defendant says :

1. The plaintiff does not show any power or authority in law, or of any company to bring suit nor to entertain the same, nor to give relief therein prayed for, nor any relief thereunder or touching the subject matter thereof.

2. The plaintiff has not made or stated a case which calls upon or justifies this court in the exercise of this discretion to permit this bill to be entertained.

3. The plaintiff has not made or stated a case which entitles it in court of equity to the relief therein prayed for, or any relief whatever.

4. The case stated is one which, as against this defendant, the assignee of said Bell patent, should have been prosecuted (if at all) with the utmost diligence, whereas, as against this defendant it is a claim contrary to equity and good conscience, and one which, by reason of the gross delay in prosecuting it, a court of equity ought not to entertain.

As to patent No. 146,787, dated January 30, 1877, the defendant demurs for the same causes as for patent No. 174,465. The defendant further demurs separately to each and every charge in said bill as the basis of an attack on the validity of said patents or either of them or any claim of either of them, for the reason that it does not show the said patent to be void, and also because the allegations therein contained, if true, would not entitle the plaintiff to relief prayed for, nor to any relief in a court of equity. The defendant specially demurs to the bill for that it does not set forth any fraud in the procuring of the patents, and that it does not specificially set forth what acts, if any, the plaintiff relies on as constituting fraud in procuring said patents, and that it does not show when, how, from whom, or by what means the complainant first had knowedge or notice of each alleged fact, nor why, with due diligence, it would not have learned them earlier.

The counsel for the United States are ex-Solicitor Gen. Goode, ex-Senator Allen G. Thurman, Grosvenor P. Lowery, of New York ; Wm. C. Strawbridge, of Philadelphia, and Jeff Chandler of Washington.

Chauncey Smith, J. J. Storrow, E. N. Dickerson and Geo. L. Roberts represent the telephone company.

J. J. Storrow opened the argument for the company, dwelling at some length upon the historical aspect of the case and of the law of patents generally. He was followed by Messrs. Goode and Lowry for the government and by E. N. Dickerson for the telephone company. The court took the case under advisement.

—— M. Gimé, electrician to the Julien Power Storage Company of Brussels, has devised an electric incandescent lamp in which the filament is surrounded by an aureole of light pleasant to the eyes. The effect is said to be produced by a filament of new material which gives an electric discharge within the bulb, which is filled with hydrogen at a pressure sufficient to give the luminosity.

Installation of Electric Light at the Paris Opera House.

Since the month of March, 1887, the Opera House of Paris has been entirely lighted by electric light. Last year they had put up in the public part of the theater, that is to say, in the orchestra, balcony, etc., incandescent lamps of Edison's patent and Jablochkoff globes.

Last spring they extended the electric lighting to the second half of all the opera.

We will describe with some particulars the inportant installation which has given a value to the building, and for which we are indebted to our comtemporary, *La Nature*.

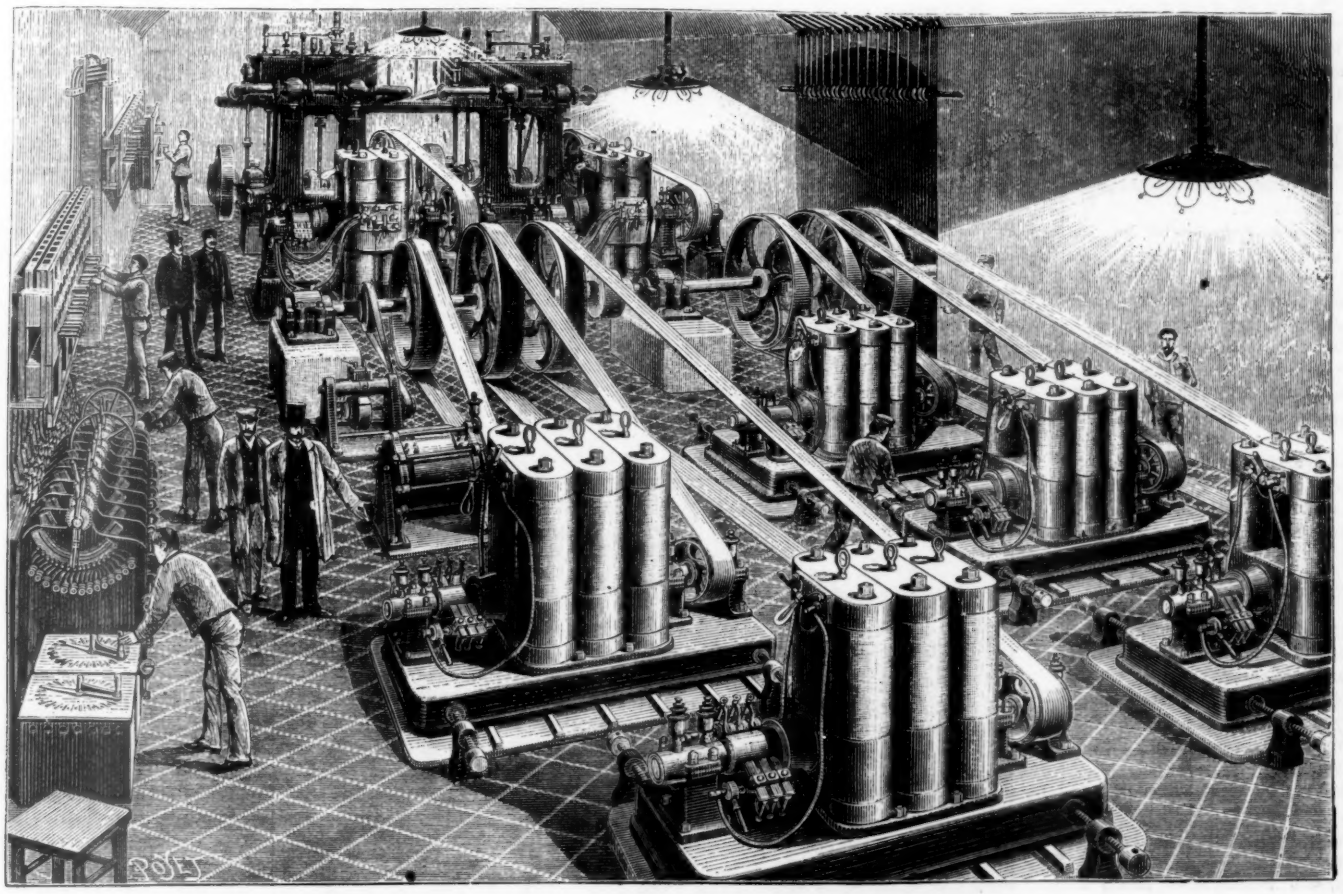


FIG. 4.—GENERAL VIEW OF THE DYNAMO ROOM OF THE PARIS OPERA HOUSE.

All the spectators can appreciate the extraordinary view which is thus given of the great staircase of the saloon, etc., by the small globes of pure white light.

From 1880 to 1883, many trials were made at the Opera House for lighting by electricity; but without any results worth mentioning. The vestibule was lighted by Jablochkoff lamps ; the banisters were lighted by lamps of the Swan patent ; and the public places by Sun lamps, combining Edison sockets, and lamps of the Maxim system. The final result was long in coming. Until 1883 the opera united the different electric light systems. One could find gas light, oil lamps, (by order of the police), and last of all, electric lights of all systems.

It was at last decided in 1884 that the

Edison light should be used; 1,800 lamps were to light the amphitheater, the scenes and the hall. The amphitheater was to be lighted by Sun lamps.

In the big lamp in the middle of the amphitheater they wished to combine the incandescent light with the voltaic arc lamps. But modifications were made on this plan.

To-day the electric light by incandescence is used in all the Opera House. The famous paintings of Baudry, which were continually menaced by the gas emitting smoke, are now preserved by this new arrangement, and the grandest theatrical edifice of Europe is safe from fire owing to this new installation.

The ground floor of this vast edifice, and the immense pillars, were favorable to the installation of the steam engines and boilers which were necessary for producing the electric light. Under these enormous arches place could be found for thousands of horse power engines. The space occupied by the machinery is, comparatively speaking, small. Three inexplosible boilers of the Belleville system, furnishing 4,900 pounds of steam per hour, are situated on the side of Halevy street, in a room measuring 6m. × 8m.70. The chimney is of 1m. 300 diameter, and 39m. high. It is invisible from outside and does not spoil the beauty of the edifice. The chimney is made out of galvanized iron and has been very skillfully combined, so that it can also serve as a ventilator.

The steam engines and the dynamo-electric machines are placed further off; partly on the side of the Opera square and partly under the grand staircase.

The service of lighting is assured by two steam engines of the Corliss system, of 150 horse power each, and condensating at will. These machines make 65 turns per minute, but when in full action 200. The principal transmission includes five Edison dynamos, each of 500 lamps; one of which is to be used in case of need. A Gramme machine, with alternating current, feeds the Jablochkoff lamps of the facade.

An Armington & Sims engine of 100 horse power is included in the plant.

If all the dynamo electric machines are put in operation at one time, they would dispose of 300,000 volt amperes in continued currents at 100 volts of potential and 10,000 volt amperes in alternate currents of 350 volts of potential, which probably represents the most important electric installation in France.

The current furnished by the dynamo electric machines is united in a general table of distribution, where the different services of lighting unite. The following is a copy of the table:

Perystile-facade, 10 voltaic lamps of Jablochkoff.

Facade-loggia, 8 voltaic arcs, Pieper system.

Great amphitheater, 524 incandescent lamps of Edison's system.

Upper amphitheater, 90 incandescent lamps of Edison's system.

Grand staircase, 358 incandescent lamps of Edison's system.

Banister, 120 incandescent lamps of Edison's system.

Upper center, 99 incandescent lamps of Edison's system.

Electroliers, 510 incandescent lamps of Edison's system.

The service of the amphitheater comprises alone 720 lamps, and took a very careful study, so as to render the effects of the light as easy as possible, the space being small.

The effects of reduction and of augmentation of the light are obtained by keys, which permit at will the lowering or brightening of the lamps. With the electric light this is obtained by interposing resistances to the passage of the current.

As it was impossible to put up in the same amphitheater the necessary resistances to produce the effects of lowering the light of the lamps, they have been placed in a second underpart, and so as to prevent the bringing back to the *jeu d'orgue* all the wires; the connections have been made directly on a great quadrant, in the second under part, the mobile touch of which is made to move by means of a chain of Gall's patent used from the *jeu d'orgue*.

This regulator of the electrolier is worth a detailed description, by reason of the ingenious use of the metallic sheets which has been proposed by M. Vernes, engineer-in-chief of the Continental Edison Company, and applied by M. V. Picou, director of the Edison factories of Ivry.

Fig. 1 represents a view of the general regulator of scene effects; 34 handles or rods put up on two ranks mounted on two shafts. They can pivot together or separately. One can engage them to the principal shaft, and by means of two wheels placed on the left of

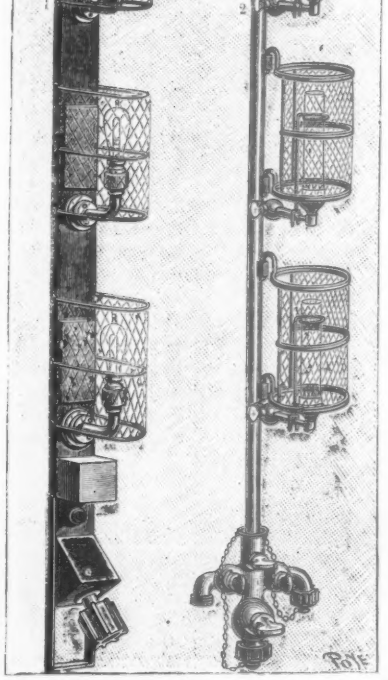


FIG. 2.—BRACKETS FOR INCANDESCENT LAMPS COMPARED WITH GAS BRACKETS.

drawing they are made to pivot. A lamp placed over each handle acts as guide to the effect of light obtained. By these means a man alone can regulate the lighting of the scene, which comprises from 1,200 to 1,600 lamps.

All the Edison lamps have been mounted on special handles joined to the existing apparatus, and coming in a branch between the gas fixtures. The disposition of these lamps, slightly inclined, giving the light between the glasses, is a very good idea. To succeed in lighting and installing electric light to this extent, and to substitute electricity for gas in so short a period was no easy task.

The wiring of the electroliers comprises a cable conductor of section of 200 millimeters square and of 270 meters of length. A very simple system of pulleys allows the cable to follow the electrolier up and down on a course of 21 met.

This first installation just described was furnished in 1886. In 1887 the complete lighting of the building was realized. Four steam engines of the compound system, of 140 horse power constructed specially for the opera house by M. M. Weyher & Richemond, of Pantin, have been installed on the ground floor by the Edison Company.

As to the dynamo electric machines they are of double capacity to the others used in the first part of the installation, that is to say in the part reserved for the public, and which feed 500 lamps of 16 candle power. The machines which have been put in since January, 1887, feed 1,000 lamps. Improvements realized by M. K. V. Picou in the Edison factory at Tory, have permitted the installation of these new dynamo electric machines of 1,000 lamps, which are claimed to be more economical than those constructed in America. Each dynamo is worked by a belt coming directly from the motor. The motor making 160 turns per minute, the armature of the dynamo making 300 turns.

To complete the service of the generators, they have installed two new inexplosible boilers of the Belleville system, furnishing 2,500 pounds of steam per hour. They are placed in the prolongation of the three first, which have each a double capacity, that is to say which furnish 4,900 pounds of steam per hour.

Supposing that all the engines are worked at the same time, at their nominal force, they would furnish a force of 950 horse power, the dynamos having a capacity of feeding of 7,700 lamps. But for the usual service of lighting, they use but 5,000 lamps of 10 candle power and 1,000 of 16 candle power each.

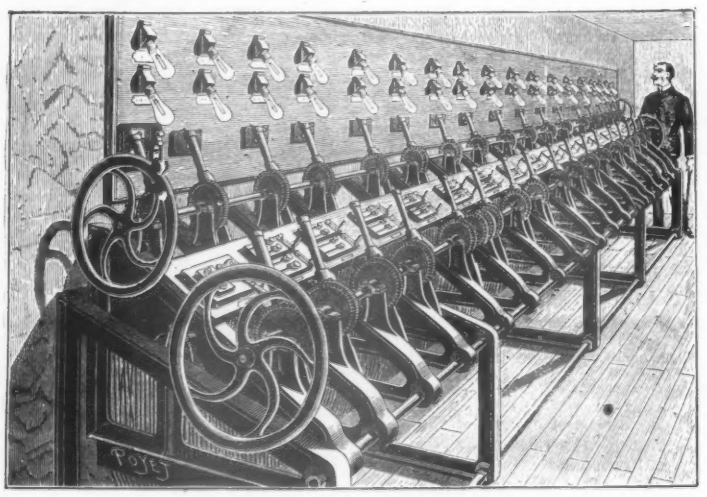


FIG. 1.—VIEW OF REGULATOR OF SCENE EFFECTS AT PARIS OPERA HOUSE.

In the Figs. 2 and 3 are represented lamps and electric lanterns used in the corridor. At the side of the new electric system we show the old gas system. Under the Edison lamps can be seen the current controller placed in a small rectangular box, the safety lead and the nut holding the current. The figures show an electric lamp (No. 1) and the old gas model (No. 2).

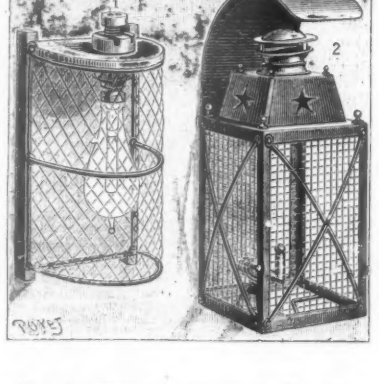


FIG. 3.—MODEL OF LANTERN—ELECTRIC AND GAS.

Fig. 4 gives the general view of the electric factory of the opera house installed in the cellars under the great amphitheater. In front are dynamo machines of 500 lamps, those of 1,000 lamps are in the back. On the left of the engraving in front, are to be seen the regulators; back of these, the table of distribution of the dynamos, and back of all, the table of distribution of the circuits or currents of the theater. The power shown in the back of the engraving are the Weyher & Richemond engines of 140 horse power.

These details will give the reader an idea of the colossal installation in the opera house of Paris, and the difficulty of the task of M. Vernes, Engineer-in-Chief of the Edison Continental Company, which was no less than the changing of 8,000 gas lights into electric lights in a theater which was kept open and going, will be understood.

The theaters which have adopted the electric light are (in Paris) the Hippodrome, the Chatelet, the Theater des Varietes, the Theater of the Ambigu, the Palais Royal and the Eden Theater.

La Nature has described the installation in most of these theaters. It is sufficient to say that the electric light, which assures perfect security as to fire, which in summer lights without giving heat and leaves the air pure, will soon replace gas in all theaters. But there is another important question, and that is whether electric light is cheaper or dearer than gas. There is nothing positive to be said on this subject. But it is estimated in general that the electric light is no dearer than gas, once the apparatus is placed. The daily payment to the company that furnishes the opera house of Paris, it is said, is no greater than for gas, and is sometimes less.

Watches on Electric Railways.

The *Jewelers' Weekly*, the authority in that field, publishes the following interesting article on this subject:

"The attention of the *Weekly* has been directed to the discussion going the rounds of the daily press in connection with the proposed electric street railway. It is stated that, under the electric influence, the watches of passengers are in danger of becoming magnetized and ruined as timepieces. A representative of the *Weekly* has taken pains to thoroughly investigate this interesting subject, as the advent of the electric motor on street railways and the prospects of its general adoption in the near future render this question of special interest to the watchmaker as well as to the watch-carrying public.

"In all electric railway cars there exists a field of magnetism sufficiently powerful to magnetize the watch of any person entering the car. This would naturally discourage owners of watches from patronizing an electric railway, which fact has been urged as an argument against adopting electricity as a motive-power on street railways.

"In conversation with one of the officers of the Geneva Non-Magnetic Watch Company, of 177 and 179 Broadway, New York, the writer was informed that electric and magnetic influences have a much greater effect on the rate of a watch than either temperature, position or isochronism, and with all the perfection which has been attained in watchmaking there is a mysterious and subtle influence which disturbs and destroys the mechanical accuracy which should result from such perfect work.

"This question of magnetism has been brought prominently before the horological fraternity, and it has long been considered that the great desideratum to be found was a correct timepiece, which should be proof against magnetic action. Many attempts have been made to produce such a watch. Gold balances and hair springs have been employed, but they could not be adjusted to temperatures, and in time the gold hair-springs lost their elasticity. A watch pro-

vided with a non-compensating balance loses from ten to eleven seconds in twenty-four hours by an increase of heat of one degree Centrigrade, and therefore could not be depended on for correct time.

"The first step toward success in this direction was the invention of the palladium hairspring by Monsieur Carl A. Paillard, a celebrated adjuster of Geneva, and this has been completed by the non-magnetic compensation balance, also invented by M Paillard, which entirely overcomes the difficulties heretofore encountered from magnetic action. The invention consists of making the compensation balance and hairspring of an alloy of palladium which is not affected by magnetic action, rust, or by moderate acids, and yet retains those qualities necessary for the closest adjustments to temperature and isochronism.

"Careful tests have been made with scrupulous exactitude, and the bulletins obtained at the Geneva Observatory with watches possessing these hair springs and balances have confirmed in a most striking manner all the calculations and fondest hopes of M. Paillard.

"If the regulating part of a watch, that is to say, the balance, together with the hairspring, should be badly affected by magnetism, which happens very often, it is clear that the going of the watch will suffer more or less, according to the fineness of construction and the delicacy of its adjustment. There are two great destroyers or enemies of all the most delicate steel parts of these little machines we call watches; one is corrosion, or rust, and the other magnetism, will all its pernicious and erratic influences.

"The necessity of protection for watches against magnetism has called forth inventors of machines and devices for demagnetizing watches that had become affected, and of a sort of soft iron shield or armor for enveloping the watch as a defense or preventive against electrical and magnetic influences. But all these are defective, for most are cures after harm has been done, and the defense provided would not stand against powerful currents.

"The facility with which magnetism is developed in watchmaking is very great, and the causes which increase its prevalence abound more every day, so that it is easy to understand the value of the discovery of M. Paillard and the importance which it represents for the maintenance of a uniform rate in chronometers and high class watches. It necessitates a very considerable amount of magnetism to cause a watch to stop; in fact, this rarely happens from magnetism alone, but its presence even in a minimum force, under most conditions is sufficient to cause a complete disarrangement of its timekeeping qualities.

"When the balance-wheel of a watch is exposed to magnetic action, its motion is retarded or accelerated as it crosses the lines of magnetic force. The wheel, composed of brass and steel, swinging rapidly over and near to other pieces of metal, encounters a certain amount of electric or magnetic resistance. These influences are intensified by the thermal currents induced by the heat of the body, the electricity and magnetism produced by the motion of the body, friction of the clothing, influence of magnetic belts, electric pads and like appliances. In many persons this magnetism is so strong that it is impossible to regulate a watch closely in their pockets.

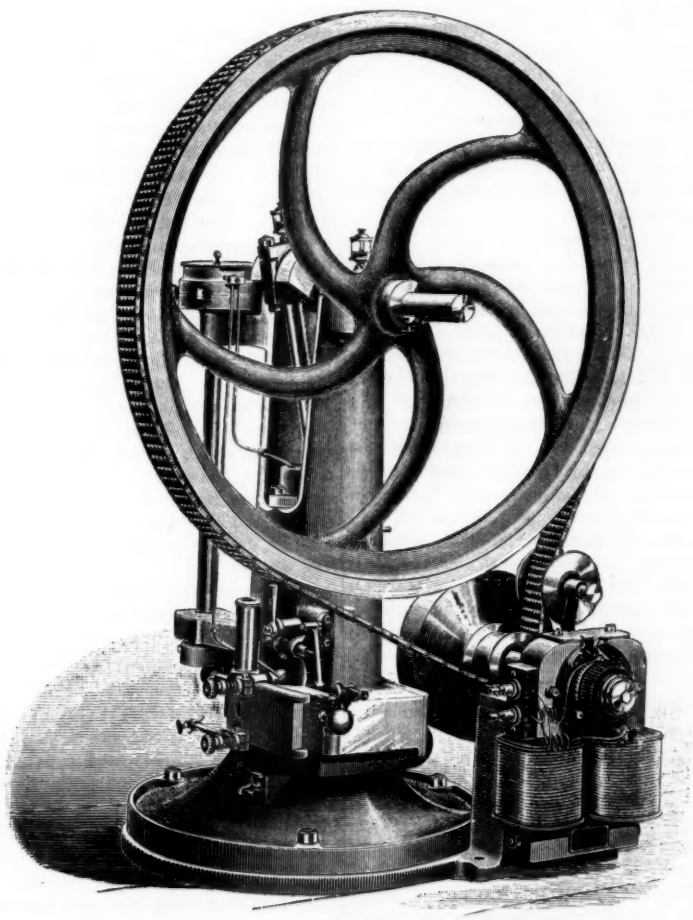
"The compensation balance and hairspring are the parts fatally affected by magnetism and electricity. The balance becomes a compass, whose poles tend to point north and south, thus interfering with its free and regular action. The coils of the hairspring are attracted toward the balance-wheel, and stick to it or themselves, and the regulation of the watch is destroyed, and it usually stops. The introduction of a piece of magnetized steel, a case spring, for instance, inside of the case, is sufficient to destroy its accuracy as a timekeeper, as the balance and hairspring will be attracted by the case spring, and their regular action impeded. A watch is the most delicate known piece of mechanism; it has been pronounced the culmination of mechanical skill in the adjustment of balance and hairspring, which were, up to a recent period, of necessity made of metals the most susceptible to the forces of electricity and magnetism.

"If we submit to the influence of a rather powerful magnet a piece of steel from a watch movement, the neutral state ceases immediately, for the piece instantly becomes permanently magnetized. This new state is easily proven in the presence of a magnetized needle; a light and very sensitive mariner's compass is a cheap and reliable instrument for this purpose. The subtle agent for mischief in watches—magnetism—can be produced in a great variety of ways, and one can say without fear of misstatement that it does exist in nearly all finished watches, and this is particularly true of those that are fine and complicated. It is manifestly difficult, if not impossible, for the modern artisan and citizen to always keep his watch outside the electrical danger line, for some of these great machines have an electrical field of great, if not unknown extent.

"In view of all this, it is easy to understand the importance of M. Paillard's invention of a balance and hair spring wholly unaffected by magnetism. In this age of the universal use of electricity this is indeed a matter of no mean importance to the art of watchmaking, and to employes of railroads, electric and telephone work and offices, engineers, conductors, and all whose business calls them among the multiplicity of electrical devices, the invention is of inestimable value.

"We believe we are right in saying that M. Paillard has enabled the modern horologist to introduce into watches and chronometers a new element of accuracy and preservation, and has supplied a want actually existing.

"The Geneva Non-Magnetic Watch Company is an American corporation owning and controlling M. Paillards' inventions, and has been organized for the purpose of bringing before the public watches of unequaled merit, containing these devices for counteracting magnetic influences. For a long time it has been subjecting these watches to severe tests, all of which have been highly successful, and have established beyond a doubt the fact that they can be worn with impunity on electric railways or in other fields of magnetism."



Combination of Gas Engine and Dynamo—Link Belting Used.

Combined Gas Engine and Dynamos Shown by Messrs. Crossley Brothers, Limited, Openshaw, Manchester.

For small domestic installations of the electric light, there are very few methods which possess greater advantages than the simple combination of gas engine and dynamo, such as we illustrated in our edition of June 4th, designed by the Sawyer-Man Company of New York. For ease of starting, comparative steadiness in running, and general convenience of working, it is probable that such means are by far the best for the purpose. We illustrate to-day a combination of this kind, the gas engine being one of Messrs. Crossley Brothers' (of London) vertical type, indicating about three horse power, with a dynamo fixed upon the engine base plates. It is fitted with the makers' patent pendulum governor, for which is claimed great rapidity and delicacy of action. The dynamo is made by Messrs. R. E. Crompton & Co., and has a special fly wheel attached, in order to secure steadiness of running. A jockey pulley is also provided to take up any slackness that may arise in the belt through wear. The dynamo is of the ordinary single horseshoe magnet type, and with the power supplied is able to keep about sixteen 20-candle power glow lamps at full incandescence.

The Bozzletown Electric Railway.

"It happened about this way."

"What happened?" I asked.

"Wait a minute," he said, "and I will tell you."

The he referred to was my friend Henry Cawsworth, of the "Piffpafe Electric Motor Company." We were dining together and I noticed a look of dejection in my friend's face. I ventured to ask the reason for his solemnity of visage, and in answer he gave vent to the above quoted ambiguous remark.

"Yes, it happened this way. You know, Bill (I am Bill), that I have been pushing this motor business for some time. Well, the other day I got a letter from Simpson—you know Simpson—in which he wrote, 'Come down here at once. Got hold of a big thing! Street railway, twenty cars. Big ducats; come!'

"I went; met the directors of the railroad company, and closed with them."

"Got a good contract," he continued, "30,000 dollars, payable after test, I agreeing that our motors would give a minimum efficiency of 60 per cent. of the dynamic energy expended."

"I tell you, my boy," he said, bringing his hand down with a bang on the table that made the glasses rattle from which we had been sipping our milk—electric light and motor men always drink, ahem! milk, you know. There was a big time in the office when I told them what I had accomplished; our stock boomed. Skipped from 12 to 130. Some of the boys got out, but I—he looked sad—stayed.

"Well, to make a long story short, we proceeded to build the road. Everything went swimmingly. I saw the editor of the local paper—I can't say newspaper—and the populace of Bozzletown were treated to the most graphic description of the wonderful light soon to burst upon their startled vision. A car, by courtesy a horse car, propelled by nothing visible—that mighty wondrous unseen subtle something, electricity. The town was agog. I may mention that our stock went to 140, and four of our directors found that their private business engrossed so much of their time that they really were obliged to part with their little holdings. I stayed, so did the president.

"Finally," he continued, after a pause, "the day for the test arrived. The town put on gala dress, and the gals were dressed—no pun—in white with blue sashes. I may mention, in parenthesis, that I was much admired. I was the creator of all that was to happen. I occasionally struck a statue dixey (new word) attitude, and tried to appear unconscious of my greatness. Made a dismal failure of it I am sure," he said, apologetically.

The time arrived to start the thing—the car. The directors of our company, and those of the railroad company, boarded the car. I grasped the lever, smiled on the assembled multitude, whose expectant faces surveyed us—gave it a pull. Suddenly I became conscious of the fact that I was describing a series of the most extraordinary acrobatic feats in the air. After a time I returned to earth, and looked around. The crowd seemed to think that it was all right, and cheered wildly. I gathered myself up, and looked for the car. There it was, about a mile away, going like the ———. Suddenly it stopped—seemed to rear up at both ends, like an army mule, and, reversing its direction of motion, fairly shot towards the starting place. On it came, and then as suddenly stopped—that is, the car. The directors, however, continued on; they absolutely refused to stay in the car, and came hustling along through the air. After a time they stopped, and picked themselves up amid the mad plaudits of the crowd, who still thought it a part of the performance which they had come to see. When they—the directors—had gathered themselves together—that is, what remained of them—they looked at me. Can I forget that look? Never! not till my dying day, and possibly not then. Finally, one of them said: "Well, sir?" The remark was exclamatory, interrogative and ominous.

I had not an idea what to say. At last I ejaculated: "Commutator needs filing; attractive influence for rails out of joint ———." Before I had a chance to proceed further, our attention was directed to the car, which apparently was endeavoring to dance an improvised Virginia reel by itself. It rushed this way and that, twisted, cavorted and performed in a manner that would have made the fortune of a circus horse. I believe it would have continued on in the same manner to this day, had some one not suddenly conceived the idea of sending to the station and cutting off the current. Even then it seemed disinclined to give in.

When at last it did stop, we—I mean I; the rest appeared disinclined to go near it—climbed in. So far as I could see, nothing was wrong. What could have been the matter? No one knew. While I was looking the thing over, Paff, our electrician, appeared on the scene. He gazed for a minute, then smiled and said: "Some fool reversed those brushes."

He fooled around for a minute, then called out: "Turn on the current."

I started to get out.

"Stop," he said; "don't be an ass; it's all right."

I am no coward, you know. I stayed. Off we started as gently and as smoothly as one could wish.

"There," said Paff, "you see it's all right.'

Up and down the road we moved. Starting, stopping, reversing, all as nice as you please. Again back to the starting point. Confidence regained. Directors enthusiastic. The president of our company, I since learned, sold out his stock to an impressionable bystander; leaving me the last responsible and surviving member of the company.

Again all entered the car. Our president had disappeared, and I, feeling tired, excused myself on the plea of the necessity of my being at the station. Off the car started—quiet and dove-like. Then, as before, bolted—stood in the air—turned a somersault. Fireworks in every direction seemed emitted from it—regular Fourth of July exhibition—kaleidoscopic effect—Washington crossing the Delaware, etc. How the crowd did yell and applaud. My boy, I went away. I see by the papers that the funerals will take place to morrow. No, I shall not go down. No, not to the office, either. Why should I? There is no board of directors left; the bills ain't paid, and, while the efficiency of the thing has been demonstrated 100 per cent. (none left), I don't feel as though I ought to ask for settlement. In fact, I fear they, the executors (post lynchers) would seem too quick for my comfort."

He paused, sighed, and said:

"Great thing, electric street railway—for a circus. Great thing—electricity. Do you know, were I writing a dictionary, I should define it: Electricity—a something which paralyzes conscience, booms stock (R. R. Co.), makes light of all things, and amuses the public; is specially adapted to convince humanity of the evanescence of all things temporal, and possibly financial."

I yawned, he sighed—we smiled (a liquid, *i.e*, milk), and adjourned the meeting by the unanimous society—Electrical Section.

ELECTRICAL REVIEW

Published at 13 Park Row.
P. O. BOX 3329.

GEO. WORTHINGTON, - - - Editor
CHARLES W. PRICE, Associate "
LOREN N. DOWNS, President.
ANDREW J. DAM, - Vice-Pres't and Treas.
C. C. HASKINS, } Consulting Electricians.
GEO. A. HAMILTON, }

SUBSCRIPTION.
United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.
Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.
Transient, 25 cents per line, nonpareil.

DEALERS SUPPLIED BY
The Albany News Company, Albany, N. Y.
The American News Company, New York, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, Brooklyn, N. Y.
The Central News Company, Philadelphia, Pa.
The Cincinnati News Company, Cincinnati, Ohio.
The Cleveland News Company, Cleveland, Ohio.
The Colorado News Company, Denver, Colorado.
The Detroit News Company, Detroit, Mich.
The International News Company, New York, N. Y.
The Minnesota News Company, St. Paul, Minn.
The Montreal News Company, Montreal, Canada.
The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
The New England News Company, Boston, Mass.
The New Orleans News Company, New Orleans, La.
The New York News Company, New York, N. Y.
The Northern News Company, Troy, N. Y.
The Omaha News Company, Omaha, Neb.
The Pittsburgh News Company, Pittsburgh, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Co., San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The Washington News Company, Washington, D. C.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Co., Toronto, Ontario, Canada.
The Western News Company, Chicago, Ill.
The Williamsburgh News Co., Brooklyn, E. D., N. Y

EDITORIAL ANNOUNCEMENT.
Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

NEW YORK, JUNE 25, 1887.

CONTENTS.

	PAGE
Bell Telephone Case	1
Installation of Electric Light in the Paris Opera House	1, 2
Watches on Electric Railways	2, 3
Combined Gas Engine and Dynamos Shown by Messrs. Crossley Brothers, Limited, Openshaw, Manchester	3
The Bozzletown Electric Railway	3
Book Review	4
Exchanging Experiences	4
Our Chicago Letter	4, 5
Our Boston Letter	5
Largest Electric Light in the World	5
A Few Electric Words from a Wideawake Insurance Man	5
Primary Battery Companies	5
Telephonic News	6
The "Tirrell" Gravity Drop Annunciator	6
The Subway	6
Report of Wire Gauge Committee	6
Norway Iron Frame Bell	6
The Lamson Message-Carrier System as Used in Telegraph Operating Rooms	7
Earthquakes and Electricity—An Experimental Demonstration	7
Electric Lighting in Paterson, N. J	7
Telegraphic	7
The Fire in the Factory of the United States Electric Lighting Company	8
A Letter from Mr. R. T. McDonald, of the Fort Wayne Jenney Electric Light Company	8
The Inter-Continental Telephone Company	8
Leather Link Belting	8, 9
Electric Light News	9
Electrical Patents	10

An alternation is a vibratory molecular reversible disturbance agitating a conductor in a field of force evolving an energetic sinusoidal effect proportional to the mechanical activity of the apparatus employed.

The electrical fraternity will regret to learn of the disastrous fire last week which destroyed property of the United States Electric Lighting Company to the amount of a quarter of a million. The loss is described and the factory illustrated on another page.

The Paillard watch, of the Geneva Non-Magnetic Watch Company, of this city, is attracting considerable attention from workers among electrical machines. This valuable and reliable timepiece, as soon as ready for introduction, will meet with a great demand from the general as well as the electrical public. The general manager of the company is now *en route* to Geneva to complete all manufacturing arrangements.

Electric light men should remember that one week should be set apart for the Boston meeting of the National Association. It begins August 9th, and will continue three days.

With $13,500 of its "4 per cent. loan" already taken, and less than one-sixth of its members heard from, the prospects of the Electric Club of New York are bright enough to satisfy its most enthusiastic well-wisher. There were thirty new members of the club elected at the meeting of the Board of Managers last week, and half as many more are applicants.

Gen. E. S. Greeley, the widely known electrical dealer, was grand marshal of the day at the impressive ceremonies of dedicating the soldiers' and sailors' monument at New Haven last week. His masterly handling of the immense crowd, civil and military, won him the deserved praise of all. Electrical men can always be relied on to fill the requirements of great occasions.

The city authorities of Paris have given notice to the theaters and places of public gathering that within three months all such places must use electric light instead of gas. This suggestion is so manifestly in the line of public safety it should receive the serious attention of the city authorities the world over. With the storage battery system perfected, all the objections that were formerly raised to the uncertainty of electric lighting are removed.

The time was once when a merchant was his own bookkeeper, shipping clerk and salesman. Increase of business compelled a change, and a division of labor. There are exceptions, and some notable ones, in the electrical field. The able electrician of one company is compelled, for the want of a suitable foreman, to supervise the construction department, and, on occasion, to box machines. Another electrical expert attends to the installation of plants and the details of interesting customers, and selling machinery. His experimental work is done at night. Instruments are conspicuous for their absence. One might as well try to wash without soap, to drive nails with a stone, as to pursue practical experiments in electricity without the most improved apparatus.

No part of an electric light installation gives more trouble to repair than the wiring, and that part at one time received less attention. There was, perhaps, some excuse when the manufacture of reliable insulation for electric wires was a thing of the future Now the best insulation costs but little more than the poorest, and the difference is but a small percentage of the cost of the whole plant. It is considered good business policy to use appliances and improvements of every kind, by which a yearly saving may be made equal to 10 per cent. of the cost. It requires but little computation to prove that sometimes the saving by reduction of rates of insurance alone will cover good interest on the increased cost of good over poor insulation.

BOOK REVIEW.

The Storage of Electrical Energy. Gaston Planté. With 89 Illustrations. Translated from the French by P. B. Elwell. Pp. 268. London: Whittaker & Co., 1887.

The interest in storage batteries has been marked during the past six years, and as practical use is now being made of them in a commercial way, any literature relating to them is a welcome contribution to the meager publications up to the present date. Planté's work from 1859 to 1879 is described in detail. If later workers in the same field had described their work with the same fullness, we should not now be so much in the dark on the subject of the storage of electricity. The translation is carefully done, and to those students who do not read French will be indispensable as a textbook on the earlier researches on batteries in which the active coating is formed from the plate itself.

EXCHANGING EXPERIENCES.

When, some two years ago, the REVIEW suggested the formation of an association of the electric light companies the project was received with but little enthusiasm. However, we succeeded in rallying a few representative men together at Chicago, February 25, 1885, and it materialized. Fortunately for the association, however, the men at the head of it—that is to say, the promoters of the scheme of organization—were not discouraged by the apathy which greeted their endeavors. They got together at each meeting as many persons identified with the electrical field as was possible; and they arranged discussions which could not help to instruct, as well as interest those present. It speaks well for the organizers of this movement that those who were once induced to attend a meeting rarely failed to appear at those that followed. And so it was that the National Electric Light Association grew, little by little. Like all successful organizations of this kind, it has required careful guidance to prevent being deflected from its legitimate aims and purposes. From the very outset there was fear that, like many another similar association, it would degenerate into an advertising medium pure and simple; its meetings furnishing an opportunity for the enterprising salesman and tooter to explain the excellencies of his wares while pretending to discuss questions of science, and its name used to sponsor apparatus of doubtful utility and mechanisms of little promise. It took a clear-headed as well as a determined presiding officer to prevent this, and, fortunately for the association, the man was at hand able and willing to do both. Of course in such discussions as naturally take place at a meeting of practical electric lighting men, more or less must be said about certain apparatus, because, in the comparison of experience which is so valuable an aid, all are glad to know of an instrument or an apparatus as they are of a system by which certain difficulties can be removed. The mention of apparatus under such circumstances is always permissible, regular, and legitimate. But a careful line must be drawn between this and indiscriminate puffing, and it is a fortunate circumstance that this line has been carefully looked after at all the meetings which have thus far taken place.

The next Convention of the National Electric Light Association will assemble August 9th, at the Parker House, Boston, Mass., and this meeting is likely to be particularly interesting and important because of the great stride which electric lighting has taken within the past year and the many and valuable improvements which have, within the last twelve month, been made in the generation and distribution of electrical energy.

No man in any way interested in electrical engineering of any department can afford to absent himself from this meeting of August 9th. It is scarcely three years ago when a great cry was raised against the voltaic arc light by a coterie of noodles, who, not satisfied with the knowledge of their own ignorance, insisted in proclaiming it to the general public.

We say that it was not more than three years ago that all the donkeys and asses in this vicinity protested against the presence of the voltaic arc light in the streets, and now not one single voice is raised against lighting the great city of New York by the voltaic arc electric light. What a change in sentiment. Are the donkeys and cranks all dead? No! There seems to be the same large number of these at large. Why, then, this decided change in sentiment? Because the electric light promoters have learned by experience how to prevent accidents and how to secure a smooth running and reliable service. Had they attempted to obtain this experience singly it would have taken a long time; but, being intelligent and clear-sighted men they attended the conventions of the National Electric Light Association and exchanged experiences; one imparting valuable information in one direction and receiving its value in information in another direction.

OUR CHICAGO LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

Another victim has been added to the long list of fatalities attributable to poor electric light installations. A young lad playing ball near the repair shops of the Boston and Albany railroad at Boston, went on the roof of the shed to recover a lost ball. The wires were low down, and poorly insulated. The boy, Dannie Sullivan, stumbled over one wire and fell with his neck on the other. A second boy, who followed, saw him, and at once shouted, "Dannie is on fire." The smell of the incineration pervaded the atmosphere, and the little fellow's clothes had to be removed before he could be got loose from the wires, one of which was in contact with his neck—the other with his knees, and his body was short-circuiting a dynamo, the *Globe* said, "of 250 horse power."

It used to be the custom, when the possible danger of some electric light or power wire was pointed out, to say: "Well, if people will keep away from it, it won't hurt them. If folks will play with fire and get burned, is the fire to be blamed? If a boy shoots himself with a gun, is the man who made the gun at fault?"

That doesn't seem very good philosophy, does it? when it is so easy to put wires on roofs where they cannot be reached accidentally, and when an insulated wire can be had, which makes an accidental contact harmless.

Perhaps this little story has a grain or two of sense, and if not exactly the whole truth, it is only changed enough to prevent its being an advertisement, and hide its origin.

The agent of an insulated wire calls upon the manager of an electric light enterprise in process of erection, and shows his samples:

Manager.—"All very nice, but I have just purchased four miles of the cremation brand of white wire. Got it cheap, sir; got it cheap!"

Agent.—"Ah; is the wire you speak of an insulated or a painted wire?"

Manager.—"Why, insulated, of course, and so cheap, too."

Agent.—"Yes; perfectly safe too, I presume. Mine is too dear. Costs about twice as much as yours, is many times better, and that trifling difference in cost will save you in rebates, drawbacks, arguments, explanations, compromises in rum, tobacco and cigars, very large money.

"The actual difference which owners of similar plants have found between four miles of this and four of undertaker wire, shows as an offset to the additional outlay of about $360, an increase of a trifle over 20 per cent. in the dividends on a $20,000 plant."

Manager.—"That's a pretty solid argument, for a fact. And I'm not likely to burn a house or kill a child. Well, I'll use this white wire inside, and have a wire outside that will stand the racket."

Then history repeated itself, and the better wire was bought.

Come to figure the thing out, the extra cost of the better wire was not two per cent. on the value of the plant, and the advantage gained in the way of dividends a very nice little plum, while the "grand satisfaction" resulting from a feeling of security can hardly be transmuted into dollars and cents.

A Western correspondent, who is competent to judge, says among their best patrons for long line telephony are the Chinamen. They use the lines constantly, and with good results—and their satisfaction is far better with this than with the telegraph. He says, speaking of the new telephone enterprise which is just about embarking for the celestial flower land, that the telegraph will be far outstripped by the telephone within the range of the long distance instruments.

The agent of an electric light company here, the other day, was perfectly dumb when asked for news. Said he: "I'm glad to see you—here, smoke—but—puff, puff—can't give you—dy'e get a good light?—anything in the way of news. Fact is—puff—your darned paper's got such a circulation,

and such a—never mind, spit anywhere—reputation for news, that by George, sir, if I tell you I've opened a piece of territory—matches, please—thanks—before I can fairly corral the district—why, I'm surrounded by these other fellows, buzzing round my honey. All owing to your letters, too. Flattery? no, sir; I couldn't flatter. Just say our company is doing splendid, satisfactory work from the Chicago agency, but don't you dare say what company it is. Come to look at it, that isn't very encouraging, is it? Just this about it my boy (?)—old enough to be my fa'her, I know—if you were representing the —— now, with its meager paid subscription list and heavy dead head roll, but the REVIEW, no, sir, not an item. It is too good as an advertiser."

The Chicago Edison Company has purchased Nos. 180 and 182 Monroe street, for which $170,000 was paid. The first central station for the South side will be located here, and the general office of the company as well. The location is an excellent one, in the heart of the central portion of the city, and easy of access.

The Illinois Legislature adjourned at 8.15 P. M. on the 15th, tired, jaded, and glad to be done with law making. A newspaper man says the Solons got every dollar there was in sight, hunted for a lot that was hidden, and failing in getting this, they adjourned as a last resort.

The regulators failed to get in their work on the telephone, telegraph and electric light companies further than to pass a bill prohibiting telephone, telegraph, and electric light companies from acquiring the right to use buildings and trees for the support of their wires by the use of such supports for twenty years or any other length of time.

The second convention of the order of Railway Telegraphers of North America, met yesterday at the Commercial Hotel. P. W. McAllister, of Minneapolis, Minn., called the convention to order and delivered a short address of welcome.

Before the opening exercises could be entered upon, Mr. H. G. Adams took the floor by a sort of snap judgment, and stated that Brother Finnan, of Baltimore, had a little piece of business to transact before the convention settled down to labor. Brother Adams' - - - — - was respected, and Brother Finnan ran ahead on special order to the station of the Grand Chief, A. D. Thurston, of La Porte, Ia., and after a few appropriate remarks, presented that gentleman, and the Grand Secretary, S. O. Fox, of La Porte, each with a gold watch and chain as a token of regard from the delegates to this convention.

The recipients were taken completely aback, their mental keys stuck and their relays sputtered. It looked a little as if a metaphorical Gray's harmonic or a Gold and Stock or somebody else's ticker had tangled 'em up.

But they finally managed to worry out an intelligent - - - — - - — — - and business was proceeded with.

The order to-day has some 3,000 members divided among 36 local organizations. It is immensely popular, and with the insurance, or mutual benefit feature properly carried out, is capable of an immense amount of good.

With the thermometer standing on its head, kicking like a juvenile undergoing a spank, the suggestion of Coney Island for the next meeting of the club, with Dr. Moses to entertain, comes to us from the East as refreshing as a policeman's smile.

But we are growing very, very independent now, for we have a club; a club that is young and vigorous; a club that threatens to be a success, and to be a haven of rest to you Eastern gentlemen, when you make a visit to the rowdy West.

Your correspondent enjoyed a pleasant call from the representative of Messrs. Russell & Co., of Massillon, Ohio, who is making the acquaintance of the electric light people hereaway. Mr. Gates complains of being very pleasantly received by the fraternity here, which, by the way, has come to be one of those facts which goes without saying.

Mr. Cyrus Emery, who has had considerable successful experience in electric light work, is in the field here, with a partial payment system of light plant furnishing, or he will equip and rent plants. He advertises in this issue of the REVIEW.

Among the distinguished visitors to Chicago during the past week are numbered Henry Bently, Esq., president, and Dr. S. M. Plush, general manager of the Bell Telephone Company of Philadelphia. These gentlemen were visiting telegraph and telephone people, and looking into underground and cable matters in Chicago. During their stay, accompanied by Mr. I. N. Miller, superintendent of the Western Union Company at Cincinnati, these gentlemen made the tour of the Western Electric Company's establishment.

And Geo. L. Beetle, too, swooped down on the inhabitants here, on the 17th, via the limited vestibule train from New York—found the weather 100 degrees, or so, in the shade, sang the song of the bumble bee who sat down on the cook-stove—and scooted for Niagara Falls next day.

CHICAGO, June 20, 1887.

OUR BOSTON LETTER

(From a special correspondent of the ELECTRICAL REVIEW.)

The Ball Electric Light Company, of New England, have moved from 63 to 61 Equitable Building, where are accommodations for increasing business of this company.

In the Lynn electric light station there a Thomson-Houston alternate self-exciting machine, circuits ¾ mile in length run to the houses of Prof. Thomson and Supt. Rice. By converters a current of high potential is transformed into one of low potential for feeding incandescent lamps. Turning on or off lamps does not vary the candle power, and they can be turned up and down. The local company has decided to add a 500 light plant of this type at once to its present equipment.

"No, it would not be fair," said a prominent electric light man, "to give the supervision of the electric light companies of the State to the gas commissioners. They already are busy with the duties assigned them, and they are presumably not as well versed in the methods of generating and distributing electricity as of gas. Either a separate commission should be created or the present one should be enlarged so as to include two subdivisions, one devoted to electrical, the other to gas inspection. Many questions could be readily decided by the full board. The electric light interests of Massachusetts are too important to be made secondary to those of the gas companies.

Boston, June 21.

LARGEST ELECTRIC LIGHT IN THE WORLD.

In the Sydney, Australia, lighthouse is the largest electric light in the world. It has a power of 180,000 candles, and may be seen from ships fifty miles out at sea. The next largest is in the Palais d'Industrie and has a power of 150,000 candles. The largest light in America is 24,000 candle power. It is at San Jose, Cal.

—— A suit has been brought by the Brush Electric Company against the Cleveland Electric Light Company in the United States Circuit Court to secure damages for the alleged infringement of a patent. The officers of the defendant company are S. C. Smith, President, S. M. Strong, Vice-President, F. J. Stafford, Secretary, Treasurer and General Manager. The bill of complaint states that on September 2, 1879, Charles F. Brush was awarded letters patent for an improvement on electric arc lamps, and that the Cleveland Electric Light Company have unlawfully made use of the invention. The Brush Company seek an injunction, the destruction of lamps now held by the defendants, and a suitable award of damages.

* * Beetle, Montana, is to have an electric railway. Mr. C. O. Bean will have charge of the construction.

A Few Electric Words from a Wide Awake Insurance Man.

To the Editor of Electrical Review:

I notice on the second page of your issue of the 11th inst., what purports to be an "interview" of the night superintendent of the Brush Company, at Boston, by a Boston *Herald* representative.

On the subject of underground electric light wires the superintendent is said to have made a statement that many people, over whose buildings the electric light wires happen to run, declare that their rates of insurance are increased in consequence thereof; and the superintendent, evidently believing this to be true, goes on to say how "ridiculously absurd" it is for insurance companies to do so, and he says that mice and matches "cause two fires to our one."

I wish to say in the beginning, that I fully believe the fires attributed to rats or mice and matches really do number two to one caused by the electric light; but lest the statement that insurance companies raise their rates on account of electric light wires being attached to buildings should find credence in the mind of any one else, I wish to correct it.

I think I may safely say that such a thing has never been done; certainly it has not in New England.

We never think of increasing the rates where electric lights are installed and used inside the buildings, and surely we do not want any electric light man to think us such ignoramuses as to propose an extra charge for their wires on good brackets and insulators being attached to the outside.

The good superintendent, or somebody else, has been deceived by the building owner, who may really have imagined such a course on the part of insurance companies, or he may have wished to strengthen his objection to the wires by such a story.

During the earlier part of the introduction of electric lights we did occasionally find some specimens of out-side as well as inside wiring that we would have felt compelled to charge extra for if we had thought it wise for ourselves or for the good of the electric light companies to have tolerated at all, but knowing that there was no excuse for such imperfect work except the inexperience or thoughtlessness of some construction man, we simply declined to grant any permits under our policies for the use of the lights in such cases, and by pointing out the imperfections, they were always speedily remedied, I am glad to say. That has been our practice here in New England from the first, *i.e.*, never to make any extra charge, but to withhold our permits until the work was made to meet our approval, and we hold that that course has so raised the standard of electric lights in New England over any other method of artificial lighting that practically it has resulted in great advantage to electric lighting interests. In many instances our rates have been reduced on account of the substitution of approved electric lighting apparatus for kerosene or gas, and I hope that the day is not far distant when my insurance brothers will so generally recognize the comparative safety of electric lighting, under the supervision of our inspector that a direct inducement will be offered for that method of illumination, by reduced rates on all property where the exclusive use of electric lights is guaranteed.

My ideas and wishes are based almost wholly upon selfishness, from an insurance point of view. I believe that electric lighting can be made safe against fire, almost to a minimum. I know that no other method of lighting can be controlled by us, or is even capable of being controlled by any one. Kerosene lamps will explode, and fall and break as a result of pure, unavoidable accident and human carelessness; and leaks will occur in gas pipes, and explosions follow as a consequence; and gas jets will ignite curtains, partitions and other combustible materials with which they come in contact. I know of no galvanometer or other test that will forewarn us of these mishaps. They come, and we pay the bill and think little or nothing of it because we are used to it; but, on the other hand, let a stray electric light fire occur, and is it passed over without mention? I never knew one to be. The stray electric light fire could have been prevented: the many others from the falling lamp or the swinging jet and fluttering drapery could not.

I do not wish to be understood as saying that there are no dangers of fire from electric lighting, for we all know that the system is capable of untold disaster in that direction, through rank carelessness or ignorance; but what I do hold is, that there is no excuse for it.

Let the electric light companies support throughout the country a system of inspection by the insurance companies, such as we have in New England, and no matter what the competition may be, the cry of fire will not be heard at their door so often. In this connection it will surely be of interest to give a few figures in relation to causes of fires from the recent report of the Boston Fire Marshal, whose duty it is to investigate such causes, as well as other duties. During the past six months he has found 39 fires to have come from kerosene lamps by explosion, upsetting, dropping and other accidental or careless handling of the article, 9 fires have been caused by gas and gas jets, 6 from candles carelessly used, only 75 from friction matches. Of the latter, rats and mice are charged in 16 instances with improperly handling them; children played with them 13 times; they dropped of their own accord and ignited 27 times, causing damage, the balance being made up in other ways. If they had not been needed to light candles, lamps and gas jets with, it is but fair to presume that some of them would not have been in the way of the accidents that befel them.

The report shows three fires to have been caused by "electric wires." There are a great many of these "wires" and their lamps also, in use in Boston.

Pardon the length of this communication. I intended merely to correct a misapprehension. Yours truly,

S. E. BARTON,
Of the Electric Light Committee New England Ins. Exchange.

BOSTON, MASS., June 13, 1887.

Primary Battery Companies.

There is a State in which projectors of great inventions are wont to form stock companies. One of the latest is the Brother Jonathan Electric Light and Battery Company, of Massachusetts, incorporated under the laws of the State of Maine; capital, $200,000; par value, $5, in 40,000 shares. The stock is now selling for $1. The would-be investor in investigating enters one of those offices. There is an air of quiet and solidity, little to attract the eye—a favorable opportunity for the imagination to play. First the general plan is shown, a primary battery which will run incandescent lights at a cost 50 per cent. below that required for gas light, that the cell costs far less to operate than any other, and the profit for its use for telegraph, telephone, fire alarm, etc., purposes alone would be large enough to make the stock worth 50 per share. The statement is made that thirty millions have been made out of the "La Glancia!" No cell is shown, but when the company produce a light from the batteries they have in process of construction the price of the stock will be raised. A report is shown of a test by a professor in a technical school, describing tests on the cell. From this it appears that there is nothing particularly novel about it except such a drop in electromotive when four amperes are taken from it, as to make it of little practical value. There are those who are paying dear for their education in primary battery electricity.

The American Electric Construction Company of Canada, Limited, Mr. W. J. Morrison, manager, operates the American system of electric lighting, and through the energetic work of Mr. Morrison has secured a number of new contracts. The headquarters of the company are at Toronto, Ont.

Telephonic News

*** The New York Insulated Wire Company, is now under the general management of Mr. J. W. Godfrey, No. 452 Broadway. The business of this company has grown to an extent that demanded Mr. Godfrey's entire time, and the opening of city headquarters.

*** A meeting of the directors of the Southern New England Telephone Company was held at New Haven, Conn., last week. The former official staff was re elected as follows: President, Morris F. Tyler; General Manager, H. P. Frost; Secretary and Treasurer, A. H. Embler; Executive Committee, Morris F. Tyler, H. P. Frost, and Thomas B. Doolittle.

*** The United River Plate Telephone Company, Limited, has over 3,000 subscribers, and its receipts for April amounted to over $40,000. Within the last two months this company has purchased the property of the Bell Telephone Company of Rosario, the second city in size and importance in the Argentine Republic. This makes an addition to the River Plate Company's list of at least 500 subscribers. The shares of this company are now selling at from 5 to 10 per cent. premium, and, as no other company has been able to secure a foothold in its territory, its prospects are most excellent. Mr. F. W. Jones, the general manager and moving spirit of the River Plate Company, is now in New York, and is to be congratulated on his successful administration of the affairs of his company.

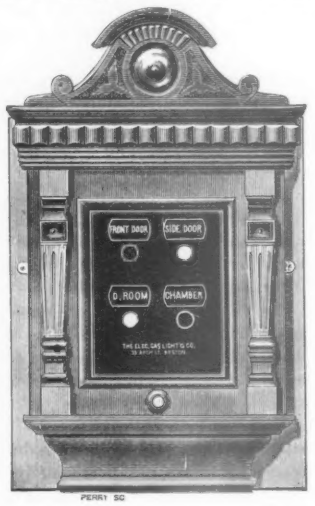
*** The rumor has got out, and is given currency in the Washington special dispatch to the Boston *Journal*, that the Supreme Court decision in the telephone cases is adverse to the fifth or priority claim in the Bell patent; but, as the dispatch adds, in the nature of things there is no way in which it can be officially denied or confirmed, the dignity of the court not permitting it to be consulted on the subject even for the purpose of protecting its good name for integrity. It is gossiped that the court is bewildered by the mass of testimony and the depth and intricacy of the points of electrical science involved, and that it defers its decision because it cannot well do anything else.

*** A Washington special of June 8th said the American Telephone Company was a new enterprise presided over by Congressman Butterworth, and intending to issue $5,000,000 of stock, for the operation of telephones in Venezuela. Mr. Butterworth ought to be informed, says the Boston *Herald*, that the Intercontinental Telephone Company of Boston, H. S. Russell, president, holds an exclusive concession granted by Gen. Guzman Blanco, June 11, 1883, and confirmed by the Venezuela Congress, as published in the *Official Gazette*, No. 3,094 of November 5, 1883. This company also owns the rights of Prof. Alexander Graham Bell and Francis Blake, and is the sole export agent of the American Bell Telephone Company. It has exchanges in the cities of Caracas and La Guayra, Valencia and Porto Cabello, aggregating over 700 subscribers.

*** The telephone is not always secret. The other morning, a Kingston lawyer who had been "rung up" several times by his telephone, without being able to find out who wanted him, finally heard the bell ring again, and, somewhat annoyed, gave the answering call, and shouted to know what was wanted. A girlish voice answered, evidently believing she was talking to someone else. Her dulcet voice said: "I have heard that you shaved your moustache off. I think you would look just lovely without any. But the next time you come to see me don't be quite so bashful." The astonished lawyer was about to reply, when he heard a male voice shout: "I think I look younger without a moustache." "Oh!" came from the girl, "you will be just too sweet without your moustache, but don't forget that you must not be so bashful when you call." The lawyer fairly howled at this. For a few seconds there was quietness along the line, and then the girl's voice was heard: "There is another man talking. Let us wait until he gets through."

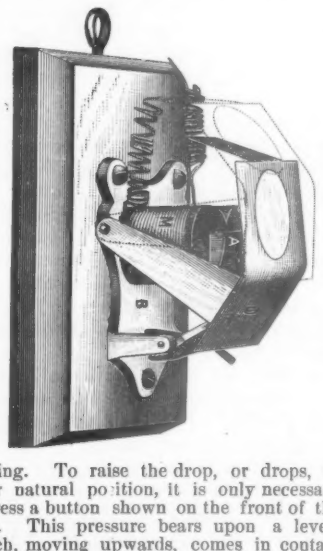
The "Tirrell" Gravity Drop Annunciator.

The combined experience of electrical experts attests the fact that the "gravity principle" is a very valuable one of both annunciators and burglar alarms. As often constructed, however, apparatus involving this principle has been more or less complicated to an extent which occasioned frequent failures to work, and, consequently, frequent readjustments, which of course entailed expense on the part of the user. The Electric Gas Lighting Company, of Boston, has recently succeeded in perfecting an annunciator on the gravity principle, which is highly



commended, and for which is claimed: Simplicity of details; no complicated mechanism; solid construction, removing all liability to get out of order; quick response and easy action; most superb finish.

The accompanying illustration of a single drop will further explain these points. *M* is the magnet, *A* the armature, *D* the gravity drop—all attached to the metallic base, *B*. When set for action, the drop impinges upon the armature by means of a small screw, not shown in the engraving. A current passing through the magnet attracts the armature, and the drop, being thus released, falls and brings the signal into sight. The same current, after releasing the drop, causes the bell



to ring. To raise the drop, or drops, to their natural position, it is only necessary to press a button shown on the front of the case. This pressure bears upon a lever, which, moving upwards, comes in contact with the drop and forces it back into place. For houses and hotels, the "Tirrell" Annunciator is very popular. They are made in all sizes and styles, to meet various demands, and are furnished in finely finished cases of black walnut, ash, cherry or mahogany, with handsomely nickel plated bells and trimmings.

The entire arrangement is very simple, and, even under rough usage, will not get out of order. The mounting of the apparatus is such that changes of temperature can not affect either its adjustment or operation.

The Subway.

The Electrical Subway Commission met last week and signed the revised articles as well as the contract for laying the conduits. The Commissioners explained that the reason for the signing was that if the Governor signed the bill the company could begin at once to lay the conduits. The substance of the findings of the commission have already been published at length and were signed by all of the Commissioners.

Mayor Hewitt and the heads of the different city departments sent a long letter to Governor Hill opposing the signing of the Subway bill. The ground taken in the letter is that there is no need of a commission to take charge of the affairs of the subway, and that the heads of the city government are fully competent to attend to putting the wires underground. The commission is charged with being "a useless and expensive obstruction to the execution of the work." The letter asks that the commission be discontinued at once, as it had "omitted the names of two out of three of the public officers whose addition to the commission alone made it endurable." This was done, it is alleged, so that the control of the commission might be kept where it is now. The passage of the bill is characterized as "the most striking instance of indifference of the Legislature to the wishes of the people of the city of New York that has ever occurred in the history of the State." A long history of the bills introduced for the purpose of compelling the companies to put the wires underground is given, as well as the bill which was introduced in 1884 giving the matter into the hands of the city officials. A bit of sarcasm is brought in where it says:

The subject of burying the wires is one of peculiarly local interest, and affects only the city in which it is to be done. The evils and perils which are believed to be attendant upon the multiplication of overhead wires, are evils and perils to which the city and its inhabitants are alone subjected, and do not constitute any source of danger or inconvenience to residents in any other portion of the State. The evil thus being purely local, it is certainly reasonable that the remedy should be intrusted to the local authorities who are directly responsible to the people most deeply interested in the abatement of the nuisance. It would be deemed intolerable if the Legislature were to undertake to appoint a commission to clean the streets of the city of New York, but even such an abuse of power as that could be better defended on grounds of public policy and necessity than can the measure now under consideration, as uncleanly streets might breed a pestilence which would extend to other parts of the State.

Report of Wire Gauge Committee.

The committee on Wire Gauge, National Electric Light Association, held a regular meeting at the office of the Boston Electric Light Company, 17 State street, Boston, at 3 o'clock on Friday 10th inst.

On the roll being called a quorum was found, the following gentlemen being present: P. Kielholtz, H. H. Eustis, Allen V. Garratt, Marmaduke M. M. Slattery; Mr. Garratt in the chair.

Communications from absent members, expressing regrets at not being there, were read. The principal business transacted was the adoption of the best authorities to be used in calculating the physical and electrical properties of the gauge, which was adopted at the convention in Philadelphia.

After a thorough discussion by the gentlemen present, it was voted to have calculations of resistance on the latest published measurements made by Mattiessen, corrected to 0° Centigrade, for pure copper. Foot notes to be appended giving constants for calculating to 75° Fahr. and to copper of 98° purity.

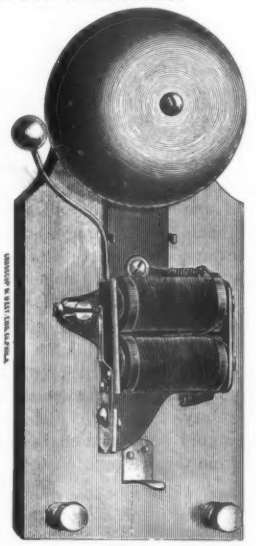
Calculations to be made by Vega's seven place logarithms and all of the work to be calculated independently by at least two members of the committee. The tables to be presented at the coming convention in Boston will include the following valves. Dimensions; Diameter in millimeters, diameter in inches, area in square millimeters, area in square inches, to be calculated by P. Kielholtz.

Weight in kilogrammes per kilometer, kilogrammes per ohm, lbs. per 1,000 ft., lbs. per ohm, to be calculated by Mr. Garratt. Length, meters per kilogramme, meters per ohm, ft. per pound, ft. per ohm, to be calculated by Mr. Eustis. Resistance, ohms per kilogramme, ohms per meter, ohms per pound, ohms per foot, to be calculated by Mr. Slattery.

Adjourned till the following day, at which time Mr. H. D. Stanley was present. Practical means of carrying the gauge into commercial use were discussed.

Norway Iron Frame Bell.

Messrs. Shaw & Geary are manufacturing a new call-bell of the best Norway iron, and find that it gives good satisfaction. The bell is illustrated below. The armature spring is of German silver, and so constructed that it can be easily adjusted for light or heavy currents. The contact points are made of pure platinum, securely riveted into position. The magnets are carefully wound to 3¼ ohms resistance with the best insulated wire. The cases are of black walnut and ash, the wood being filled and polished. The gong and binding posts are handsomely nickel-plated, the latter being made on the order of the English binding post, with long screw, allowing two or more wires being wound under the head without danger of dropping off. The working parts of our bell are so adjusted as to give the full, clear tone of the gong, and will give satisfaction over a long circuit with small battery power. The company guarantees that the bell will require less battery power for long-distance work than any bell of the same resistance now on the market.



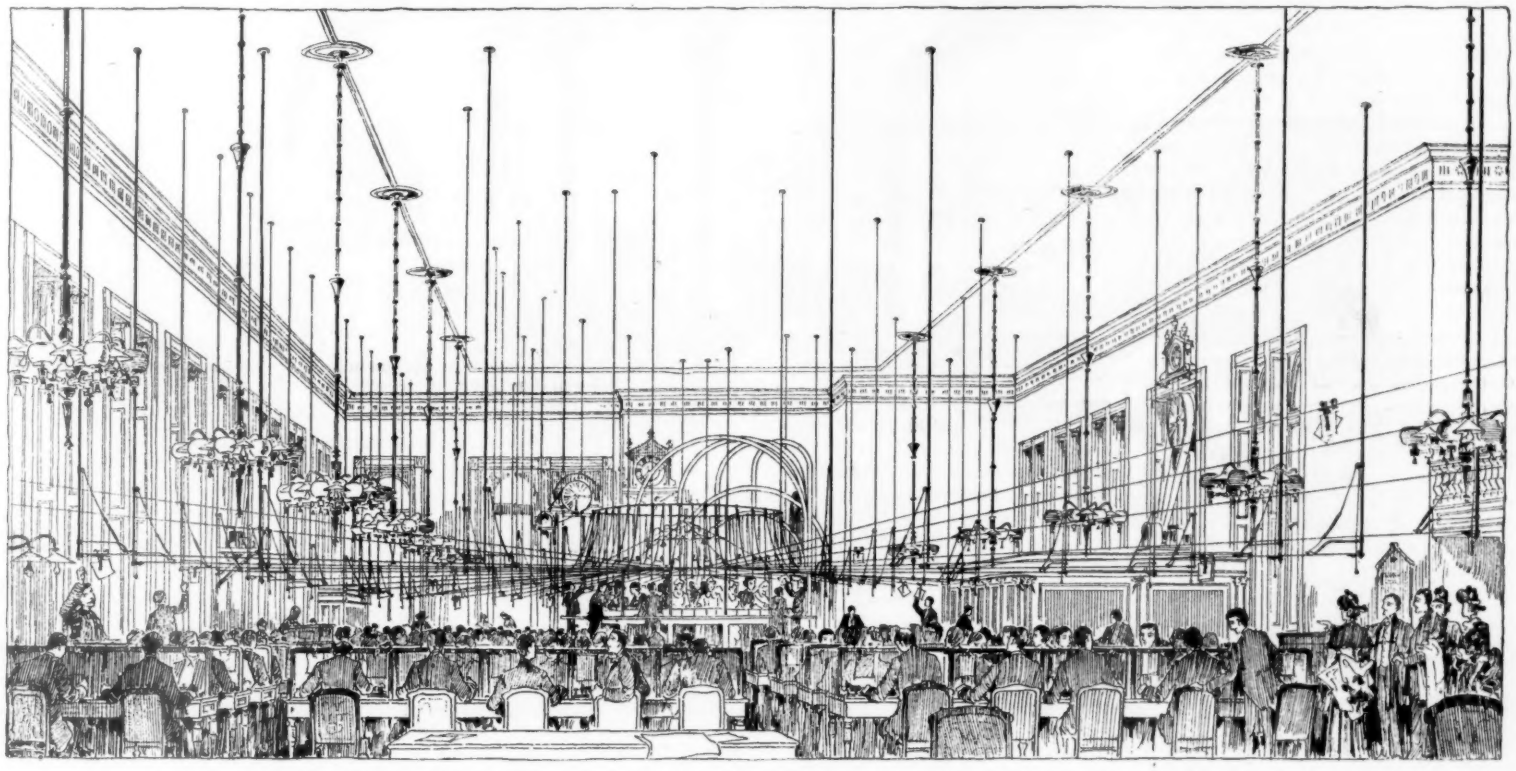
*** And now comes a wonderful new a-cow-stick telephone, anti-electric, anti-distance, anti-induction, claimed to be everything except antedating all others. The wire does not require to be stretched, but may be laid loose on the ground, around trees, under water, without any defect in the sound at the receiving end. The inventor hopes to dispense with the use of the wire entirely, and possibly this may be done when his backers dispense with him.

*** The annual meeting of the stockholders of the Erie Telegraph and Telephone Company was held in New York last week. The treasurer's report was read and adopted. A ballot for directors resulted in the re-election of the old board, as follows: James W. Bennett, Charles J. Glidden, Charles E. Adams, Francis Jewett, A. C. Russell, J. W. C. Pickering, A. W. Sherman, of Lowell, Mass.; James A. Weston, of Manchester, N. H.; Wesley A. Gove, of East Boston, Mass.; and W. J. McKinnie, of Cleveland, O. Over 31,000 shares of stock were represented. The annual meeting of the directors was held at noon and organized by the re-election of the following named officers: President, James W. Bennett; Secretary and Treasurer, Charles J. Glidden; General Manager, James P. McKinstry. The following appointments were made: Transfer Clerk, Charles A. Grant; General Superintendent northwestern division, Charles P. Wainman; General Superintendent southwestern division, John K. Dunbar.

The Lamson Message Carrier System as Used in Telegraph Operating Rooms.

The illustration on this page presents a view of the main operating room of the Western Union Telegraph Company, at 195 Broadway, in this city, fitted up with the Lamson Message Carrier, which has proven a remarkable aid in expediting the enormous telegraphic business of this office. There are in use here sixty stations, all connected by a slender steel wire to one central home station, as shown, where messages are received and quickly taken off by the attendants and distributed. The clips carrying the messages pass noiselessly along these wires until they reach their destination at either end, where they automatically interlock with a fixed spring motor and come silently to rest. When ready to be returned an easy downward pull of a few inches (varying from five to nine, according to the speed and distance) upon a cord pendant from the machine, puts the spring in operation, and when sufficiently tense automatically releases the clip, which glides swiftly and silently forward as if impelled by a magical force. The speed of the car, as well as the distance to be traversed by it, are regulated by simply adjusting a button upon the cord. A speed of 100 feet in from three to four seconds is easily attainable.

ting rooms, it was essential that the distributing tables should be in the center of the room, in order that the journeys of the messengers to and from the operators' desks, in picking up and distributing telegrams, might be minimized. With the message carrier system, this is unnecessary, and this fact was taken advantage of by the Baltimore and Ohio Telegraph Company in arranging their new operating room. The stations being distributed through the room, the office boy places his dispatches in the nearest clip, pulls the spring, and in two or three seconds the clip reaches the distributing table. The distributor places it in its proper receptacle, when it is taken by the "home station" clerk, placed in another car clip and sent to its proper destination. Formerly the messenger would take the message from the wire desk, walk with it to the distributing table, and then go back to his particular territory for more business, thus traversing in the course of a day many feet of flooring now unnecessary. The time consumed in covering this useless ground, of course, tended more or less to delay business in reaching its destination, and in the telegraph service every second counts. The carrier system, in the very nature of it, prevents the boys from loitering. It keeps them apart, and thus prevents gossiping. In fact,



View of Western Union Operating Room, New York, Fitted up with Lamson Message Carrier System.

The value of this system in an office where every second of time is calculated can be easily seen, and the fact that the Western Union has adopted it at its largest and busiest office is a strong indorsement of the great advantage it gives. Superintendent Humstone, in a letter to Milton F. Adams, special agent of the Lamson Company states that the message carrier system has "minimized the delay in handling business in its transit through this office." As an indication of the value placed on the system, the advantages became so apparent before the completion of the original plant of thirty stations that it was decided to enlarge, and the number was doubled.

The idea of utilizing this important invention for distribution of messages in telegraph operating rooms originated with Mr. Adams, who first presented the matter to Mr. D. H. Bates, president of the Baltimore and Ohio Telegraph Company, who permitted experiments to be made in the Baltimore and Ohio offices at 63 Broadway. The result was so satisfactory that the Baltimore and Ohio Company immediately adopted the system, and now have an extensive plant in constant use in their new operating room at Canal street and Broadway, New York city.

Before the introduction of the Lamson message carrier system into telegraph operathe system acts the part of a tread-mill, so far as the messengers are concerned; for, while there is a message to distribute, they have no rest, inasmuch as the messages, being constantly in the sight of the manager and his assistants, must be kept moving. Notwithstanding which the office boys admit they are not so tired at the end of the day now as they formerly were, their movements being confined to a circumscribed territory.

In adapting the apparatus for the rapid transmission of cash in stores, to the busy whirl of the telegraph and exchange business of the country, Mr. W. S. Lamson, the general manager of the Lamson Store Service Company, is carrying out the policy that has apparently placed this company in the position of being without a competitor.

.... At the annual meeting of the stockholders of the Municipal Signal Company, of Boston, held on the 15th inst., at Portsmouth, N. H., the following gentlemen were elected directors, viz.: Col. Albert A. Pope, Jno. C. Wilson, Geo. W. Gregory, Willard White, E. Hyde Rust, Thos. Roche, Jarvis D. Braman. This company is meeting with much success in municipal work.

Earthquakes and Electricity—An Experimental Demonstration.

The following facts have been made the subject of a very careful investigation by the French military authorities, and there appears to be no doubt as to their absolute correctness: On the 28th February, during the continuation of the disastrous earthquakes in the Riviera, a soldier in the fort of Tête-de-Chier at Nice, was engaged in working a telegraph instrument communicating with another part of the town. At this moment the third earthquake of that morning took place; this was the least violent of the three great shocks. The soldier was thrown from his seat, and received a severe electric shock through both arms and across the chest. It was some minutes before he recovered the power to move, and he remained in hospital for the rest of the day. As already mentioned, the affair has received a most careful investigation, and the French authorities consider the fact to be thoroughly well established. The important question now arises, whether the electric phenomenon is a cause or an effect. In the light of the recent experiments of Prof. Milne in Japan (which will be found fully described on page 409 of our last volume), it will be seen that an earth current may always be looked for as the result of an earthquake, though when we consider the enormous amount of electric energy which must have been in play in order to knock down a man through what was practically a shunt-circuit of comparatively enormous resistance, it is impossible to deny that the electric force may as well have been the cause as the result of the disturbance.—*London Electrician.*

Electric Lighting at Paterson, N. J.

The Paterson Electric Light Company has just concluded a very satisfactory contract with the city, by which it will furnish all the electric lights for public use for the next three years. There are at the present time 165 arc lights in the city, 66 of which are public lights, and the council has just ordered about 30 more. The company has a very complete station, containing 10 dynamos run with an improved Watts-Campbell engine. A number of Sawyer-Man incandescent lamps are lighted direct from the arc circuit by means of the Little-McDonald cut-outs, which are giving full satisfaction. The company expects to put in about 300 of these cut-outs, using the Sawyer-Man lamps.

Mr. John F. Noonan, the head and front of the electric light company, also has charge of the telephone exchange, and to his energetic work the extent of electrical work in Paterson is due. Mr. Geo. F. Matthews is in charge of the electric light station, and keeps it a model one in appearance and efficiency.

TELEGRAPHIC

....A severe electric shock was felt by a telegraph operator of Nice during the earthquake of February 23. A study of the phenomenon has convinced M. Onimus that earthquake movements are normally accompanied by strong electric currents.

....In course of centuries perhaps, says a contemporary, the chronograph and the nineteenth century chronometer may become as old fashioned as the hour glass, the sun dial and the water clock, and then be found only in allegorical pictures or poetic figures. But at present the American people have to content themselves with these instruments for measuring time, and with the electric telegraph as the best available means of communicating it.

The place where time, if not made, is served out by the Government, is at the Naval Observatory in Washington. The apparatus for noting and keeping track of the time fills considerable space at the observatory. It is a sort of sacred place, for an awkward and careless person admitted to this temple of time might do damage to the delicately adjusted apparatus, that would put out all the clocks in the United States before things could be made right again. There is the great clock which is mounted like some oracle on a granite block or post. This granite pillar has its foundation deep in the earth. The works of the clock are attached to the enduring and motionless stone, and are entirely independent of their wooden case or cover. No heavy foot-tread in the building, no rumbling cart in the road outside, nothing short of an earthquake, would disturb the motionless and serene dignity of this ocular clock. This clock is adjusted to tell Washington mean time, or time of the Washington meridian. There are two other clocks solemnly mounted on granite posts, and which are set to standard time. These clocks are connected with telegraph lines that send the time at noon all over the country, ring the Washington fire alarm bells, regulate 300 clocks in the Government buildings, and at the same instant drop time balls on tall buildings in different cities, stretching in a long line from the Atlantic to the Pacific. Only one of these clocks is kept running at a time. The other is kept in reserve, to be used in case of need.

The Fire in the Factory of the United States Electric Lighting Company.

A fire broke out in the incandescent department of the great factory of the United States Electric Lighting Company, at Newark, N. J., Friday afternoon, June 17th, and destroyed the property of the company to the amount of probably $250,000, all covered by insurance. Fortunately, all the general machine shops, laboratory, dynamo and arc lamp departments, engines, boilers, etc., were saved, the fire being confined to the south side of the immense works, originating just back of the first chimney shown in the view of the works which we illustrate on this page. The incandescent department was entirely consumed, also the office, the stock department, and glass blowing and lamp exhausting departments. The cause of the fire is supposed to have been from a gas leak or from spontaneous combustion resulting from waste. There was no electric current in the room where the fire originated. The fire burnt very rapidly, the walls falling in 15 minutes after it was noticed. Over 300 employes are thrown out of work.

A temporary factory for the manufacture of lamps has been arranged for, and the energetic management expect to be able to fill orders with but slight delay. The company recently purchased a tract of land adjoining for the purpose of increasing factory facilities, and will now build on a very much larger scale. Plans for the new work are now being considered. The company has been greatly crowded for months past, and has been working its factory force until 10 o'clock at night. While the fire will undoubtedly cause some delay, every effort will be made to reduce it to the minimum, and a factory with greatly increased facilities over what was already most extensive works will be at once provided.

President G. W. Hebard, of the United States Company, was a prompt arrival at Newark, and devoted his energies to arranging matters so that the heavy business of the company would not suffer loss. In an interview with a REVIEW representative on Monday, he expressed confidence in being able to soon overcome the natural consequence of such an extensive and sudden conflagration.

A Letter from Mr. R. T. McDonald, of the Fort Wayne Jenney Electric Light Company.

To the Editor of Electrical Review:

Nothing is more disagreeable to us than to come before the public with a grievance; and only an injury for which the law affords no adequate redress, and a sense of duty toward one who has gone from us, could induce us to publish the statement we here submit. Some weeks since the following appeared in the *Inter-Ocean*, of Chicago, as a special telegram from Fort Wayne:

"WORRIED TO DEATH.

"FORT WAYNE, IND., *April 18th—Special Telegram.*—It has become an open secret during the past few days that the recent suicide of Oscar Simons, one of the wealthiest bankers in Indiana, was caused by financial worriment. At the time of the suicide it was said that long illness had made him melancholy, and had even driven him to end his life. Recently, however, his friends have acknowledged that Mr. Simons thought himself financially embarrassed, through his connection with the Jenney Electric Light Company, on whose bonds he had signed his indemnity for an amount, it is said, of $700,000. These bonds were given by the Jenney Company to parties contracting for their light, and were to secure such parties against any suit for damages brought by the Brush Company, which has claimed for some years that the Jenney light was an infringement on their patents, and in every instance where persons contracted for the Jenney light, they gave warning that they would be held liable for damages. Shortly before Mr. Simons' suicide the Brush people began to push those suits, and the fear that they might prove successful weighed upon his mind, and although, even if he had had to pay the damages, he would have had an ample fortune, he is said to have frequently told his friends that the prospect of the loss of the bulk of his fortune worried him considerably."

The article did not come to our notice for a few days after its publication. We were astonished at its appearance, and considered at the time whether we should not contradict it. But thinking that the great world doesn't care very much about the affairs of our company, and that probably it had already passed out of the minds of those who had seen it, we determined to take no notice of it. But shortly after it appeared elsewhere, and in one paper after another, and in quarters where one would hardly expect it to go by its mere interest as a matter of news. We shortly perceived that it was being sedulously circulated through the press.

The article itself is totally false in every substantial particular. We believe that our books show every bond ever signed by Mr. Simons for the company. The total amount we find on them is $44,000. In these he was joined by three or four other responsible parties; so that his total liability was less than $9,000.

Mr. Simons' sad death by his own hand took place when he had lost his reason in consequence of disease, brought on, in a general way, by long years of overwork. His affairs never were more prosperous than during the latter year of his life. His attention to the business of this company was part, but only a very small part, of the great load of work under which his health gave way. He was interested in many corporations besides this, and had a large private estate to which he gave constant personal attention. To say that his death was in the least degree attributable to the Brush Company's patent suit is utterly false. He was a brave and fearless man, and he met all his responsibilities in this world without shrinking. He was the last man in the State of Indiana to be scared by a lawsuit. We owe it to his memory, if nothing else were involved, to repel this slander upon his courage and manhood.

Respectfully,

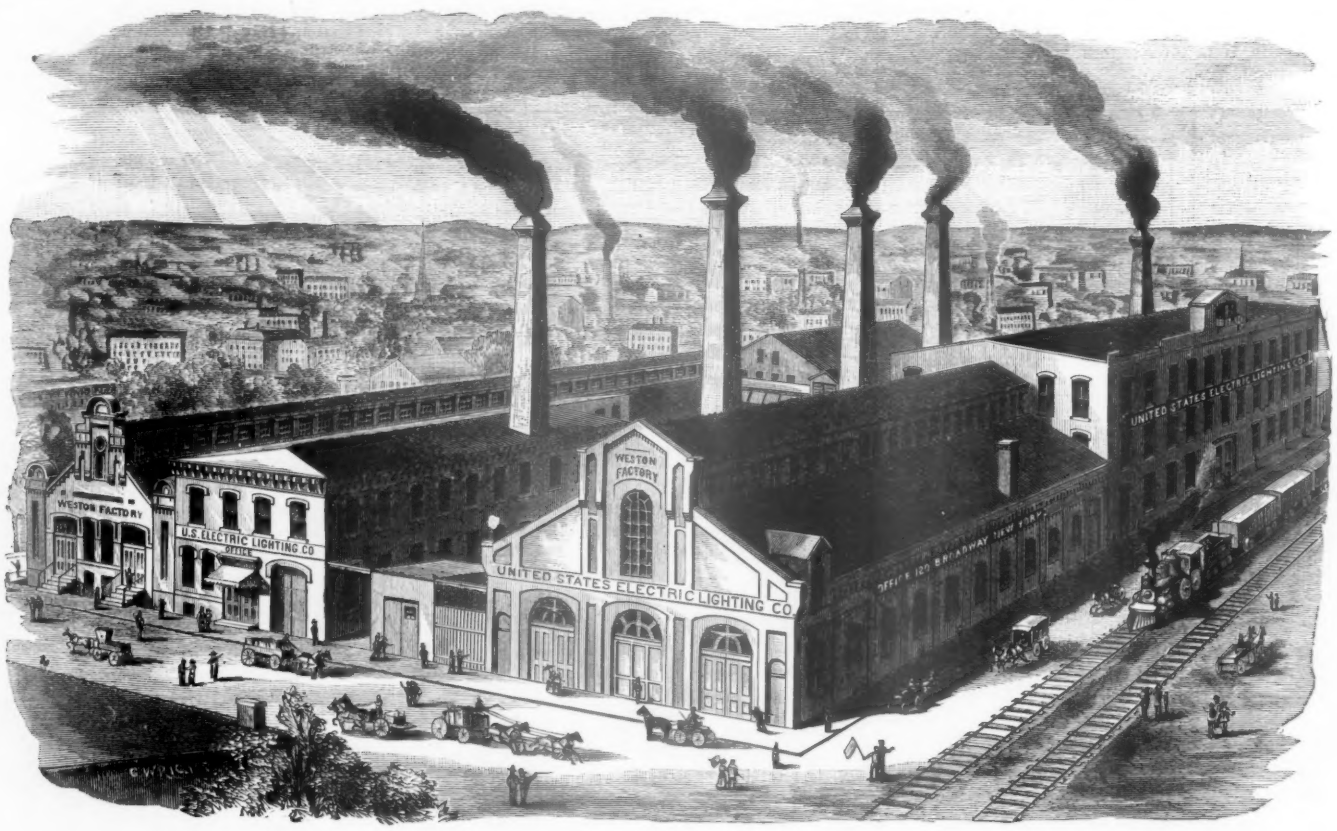
R. T. MCDONALD,

Treas. Fort Wayne Jenney Electric Light Co.

Inter-Continental Telephone Company.

The Inter-Continental Telephone Company, of New Jersey, acquired the rights of the Tropical American Bell Company in Venezuela, United States of Colombia, Panama and Central America. A concession from the Venezuelan Government was secured of the exclusive right to establish and maintain telephonic lines and exchanges in Venezuela. Within the time set for the commencement of the work, large numbers of telephones were regularly in use. The Government, according to agreement, received 5 per cent. of the gross earnings regularly, and the stockholders received their dividends quarterly. According to the terms of the concession granted in 1883, the company were given three years in which to provide with exchanges all cities that could support a telephone system. This was done, and about $100,000 spent for construction and apparatus. Iron posts were used, trunk lines built, as the company had agreed to do. They are the assignees of the inventors of telephonic apparatus, and as such have the full rights of the inventors in the various countries.

In 1884 one Padrone received a concession from the Government, in article 1 of which it expressly says: "Telephone lines having been run in the following places (the principal cities are named) are excluded from this concession." This expired by limitation, was extended, and was amended in January, 1887, again recognizing that the Inter-Continental Company had some rights. This, however, was annuled April 21, 1887, on petition of Padrone himself. On the 9th of May the American Telephone Company was organized, with $5,000,000 in $1 shares, sold for $10. Not a mile of wire has ever been run in Venezuela, except by the Inter-Continental Company. It is said that ten miles of wire and instruments have been sent out by the American Company. If they build a line over the mountain from Laguayra to Caracas, they cannot transmit written messages, as that would be in direct violation of the Government rights, and having no exchange in either place. A would have to go to the telephone in Laguayra and wait until B had been found in Caracas and brought to the telephone, before any talking could be done. A quiet outlook for the new enterprise. The present company is occupying all of the field in which a profitable business can be done.



VIEW OF THE EXTENSIVE WORKS OF THE U. S. ELECTRIC LIGHTING COMPANY, THE SOUTHERN PORTION OF WHICH WAS BURNED DOWN.

Leather Link Belting.

A PAPER READ BY MR. CHAS. A. SCHIEREN, BEFORE THE "TECHNISCHEN VEREIN," OF NEW YORK (A SOCIETY OF CIVIL AND MECHANICAL ENGINEERS), MAY 28, 1887.

Mr. President and Gentlemen:

The old saying that "there is nothing new under the sun," may well be applied to leather link belting. It is generally believed that these belts are of recent invention, but that is an error—they are over thirty years old.

Mr. C. M. Roullier, of Paris, experimented that long ago with small leather links one and one-half inches long by three-quarters of an inch wide. These links had two small holes at equal distances apart, and were joined with iron bolts, which were riveted at the ends, thus making a perfectly flat surface, and in that way forming a belt entirely of leather links.

Mr. Roullier's idea was to economize; he therefore utilized the material, left over from the manufacture of flat belting. He perfected his belt and came to this country in 1862, where he patented the article here and tried to introduce it. At first it produced quite a sensation, and many tests were made, but it was soon found that Roullier's belts were not suited to running our swift motion machinery and they were therefore abandoned as impracticable.

Mr. Roullier then introduced his invention into England, where he met with some success, as his belt was better suited to English slow motion machinery.

These belts are now largely used in England, many good improvements have been made in them, and almost every belt maker in Great Britain manufactures them.

Mr. Jabez Oldfield, of Glasgow, has the reputation of making the best and most reliable link belt in Great Britain. He has also the reputation of being the originator of these belts; this is, however, an error, the credit of the invention belonging, as we have said, to Mr. Roullier.

Mr. Oldfield, nevertheless, has invented many useful machines for cutting and assorting the links. He has also introduced improved methods for putting the links together.

For more than twenty years after Mr. Roullier's visit, nothing was done with leather link belting in this country.

In 1882, however, Mr. N. W. Hall, of

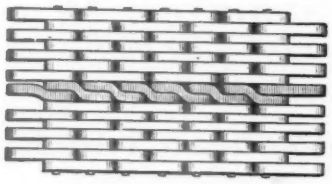
Newark, N. J., patented a link belt, composed of leather and steel links. His method was to place a steel link after every third or fourth leather one, in order to strengthen the belt. In practical use this belt was found to be very defective, because the leather links soon stretched, and thus all the work had to be done by the steel links. The whole strain coming thus upon the steel links, they in course of time cut through the bolts and thus broke the belt to pieces. So this invention proved worthless.

In 1884, a Chicago Belt Company obtained a patent on another style of link belt. In this belt all the little holes in the links were lined with metal, similar to the holes in laced shoes. This produced an effect similar to that produced by Hall's patent. The metal lining of the holes cut the bolts into pieces by friction, and thus ruined the belt; therefore this patent proved a failure also.

After all these failures it fell to our lot to improve these belts so that they may now be worked successfully on our American fast running machinery. During the past two years we have made and sold over five hundred leather link belts, which are all in actual use, and doing excellent service, as is proved by many testimonials which we have received.

Our success with these belts has beeen so surprising that we think we have found, at last, the long looked for "missing link," not in "Darwinism," however, but in the belting

FIG. 1.



line. We prophesy a great future for these belts in this country.

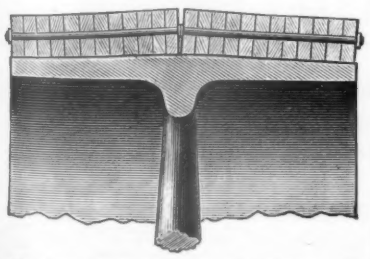
How have we attained such success? First, we found that Roullier made a mistake in using leather offal; as in the links of an iron chain, if one link is weak or defective the whole chain is worthless, so in link belts, if one or two links are weak or made of poor material, the whole belt is affected by them. It is therefore of vital importance that only the best and most solid leather be used in making the links; second, the leather must be made very pliable, but at the same time its toughness and tenacity must not be injured, or it will stretch and break.

These things are of great importance, and are the principal reasons for the failures of all former efforts. The leather which Roullier used was stiff, hard and husky. He believed that the harder the link, the greater its tensile strength; but upon actual test this was found to be a fatal error.

Our leather links are saturated with a mixture of tallow, neatsfoot oil, etc. This makes them very pliable, and increases their toughness, so that they will stand a strain three times as great as a piece of hard rolled sole leather.

In manufacturing this belt, the joining together is important. The links must be accurately assorted as to thickness, and the outer links countersunk, to admit the bolt. Then the most valuable improvement of all is our "American Joint" (see figure 1).

Fig.2.



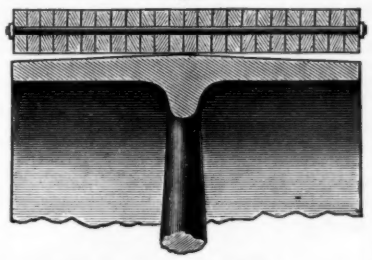
By close inspection you will observe that it is absolutely necessary to use half length bolts for the width of wide leather link belts.

Examine Figs. 2 and 3. In the latter you will notice one length of bolt placed on a round-faced pulley. That belt must either bend or break and in any case it will not give satisfaction; but on the other hand examine Fig. 2—here two half length bolts are used, and ingeniously joined in the center. It gives just pliability enough to lay the belt flat upon the pulley. We experimented for some time before perfecting this important improvement.

We also took out four patents for different methods of joining, but abandoned them all and adopted the "American joint" system. (Fig. 1) as the most efficient, simple and reliable. It gives the belt an unbroken flat surface, and is far superior to anything so far introduced for that purpose.

We have not stopped at flat link belting, but have turned our attention to manufac-

Fig.3.



turing round solid leather link belting, and believe that we have almost attained perfection in that line. As the illustrations clearly show there is quite a demand for inch and upwards solid round belting, and the difficulty always has been to join such a belt together. All steel hooks, etc., do not seem to satisfy. This, our new invention, is so simple that it hardly needs explanation. A belt of this kind can be taken apart in a short time, and shortened or lengthened at pleasure.

Now, Mr. President and gentlemen, I shall be glad to answer any questions in reference to these link belts, or give any further explanation you may desire.

Ques.—Can these link belts be used on dynamos for electric lights?

Ans.—Yes. In England they are used most exclusively on dynamos; however, they run only 700 revolutions per minute there, whereas our slowest dynamo runs 1,100.

Ques.—Would you advise link belts for high rate of speed?

Ans.—No; they give better results on slow-running machinery.

Ques.—Have these belts any special advantage over flat leather belting?

Ans.—Yes, decidedly, when belts are run half crossed or what is termed quarter turn; it is very hard to make flat belts lie perfectly even on the pulleys; these link belts, however, cover the entire face of the pulley (see illustration), and therefore are superior for that purpose.

Ques.—Why do they give better results when run slow?

Ans.—Partly because of their great weight over ordinary belting; also their grip power is stronger when run slow; no belt is su-

perior to them for slow hard-working machinery.

Ques.—Are they more expensive than ordinary flat belting?

Ans.—Not when compared to the work they can accomplish.

Ques.—Can they be run in wet places, such as mines, etc.?

Ans.—Yes; by waterproofing the leather, no cement being used as in flat belts; the links can be made positively waterproof. We have furnished paper mills, tanneries and bleacheries and other exposed places with waterproof link belts and all have been entirely satisfactory so far.

Ques.—Can they be run on ordinary flat pulleys?

Ans.—Yes; our "American Joint" link belt can be run on any straight or rounded pulley, whether made of iron, paper or wood, and being all endless they run much smoother than other belting.

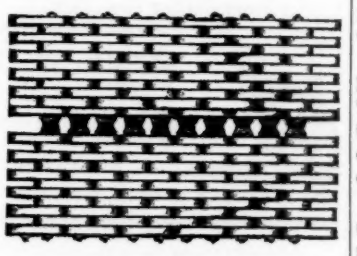
Ques.—How are they made endless?

Ans.—By a very simple process (see illustration) and takes almost less time than lacing a flat belt. All that is necessary is to take both ends and interlock the links, then pass the bolt through and rivet it, and when you wish to shorten the belt proceed likewise: file off the end of the bolt and take out or add rows of links at pleasure and rejoin it again.

Ques.—What is the relative strength of a link belt compared to flat belting?

Ans.—Nothing definite has yet been ascertained. We are preparing a table showing results, and so far we can report that they can stand about twice the strain of double flat belts. A four inch link belt one inch thick is able to do the work of an eight inch flat double belt.

Ques.—Explain the advantage of your American joint over the English hinge.



ENGLISH HINGE JOINT.

Ans.—The American joint gives a perfect unbroken surface of entire width of belt, whereas the English hinge joint makes two half widths, and whenever a sudden change of power occurs and the belt runs half way off the pulley, it will catch at the edge and tear everything to pieces.

Ques.—Have you a table or schedule of their weight per square foot?

Ans.—Yes; the following is as near as we can estimate the weight of leather link belting per square foot:

1	inch thick,	about 5	lbs.	per	sq. foot.
$\frac{7}{8}$	" "	" 4½	"		"
$\frac{3}{4}$	" "	" 4	"		"
$\frac{5}{8}$	" "	" 3½	"		"

Upon motion a vote of thanks was passed and the paper read ordered to be printed.

The Boston Electric Club.

(Special Telegram to ELECTRICAL REVIEW.)

BOSTON, June 22.—Boston Electric Club, fully organized, sends greeting to ELECTRICAL REVIEW.

FRANK RIDLON, Prest.
R. F. ROSS, Sec'y *pro tem.*

—— L. C. Kinsey & Co., the electrical accumulator representatives of Pennsylvania, have just contracted to place a storage battery plant of 3,200 lights in Allentown, Pa.

—— A 200 light series wound incandescent dynamo gave perfect regulation from 50 lamps to the full load. Below 50 the candle power and consequently the electromotive force began to fall. A practical electrician gave the following explanation of the working of the machine. The field reaches the saturation point when supplied with the current of 50 lamps. If now 100 lamps more are thrown on, although three times as much current is passing through the field, *still* that is but little stronger than before, and the electromotive force of the machine only enough higher to make up for the greater drop in the dynamo and external circuit with increased load. The difference of potential at the dynamo terminals is constant for loads varying from 50 to 200 lamps, as the field is saturated and therefore constant."

ELECTRIC LIGHT NEWS

—— The Excelsior Electric Light Company, of New York, has just erected lights n Gadsden, Ala.

—— The Electric Service Company, of Buffalo, filed a certificate of incorporation Monday. The capital stock is $40,000.

—— The Eickemeyer Dynamo Machine Company, Yonkers, N. Y., has been incorporated, with a capital stock of $60,000. Mr. Rudolf Eickemeyer and others are incorporators.

—— The Citizens Electric Light Company, of East Boston, Mass., has increased its plant by adding five new American 50-light dynamos This order for 250 arcs makes the plant capacity about 400.

—— The Glen's Falls Gas Light Company, of Glen's Falls, N. Y., adopted the American system of electric lighting some months ago. The combination has proved so popular with the people of Glen's Falls that the gas company have given an order for doubling the quantity of their apparatus.

—— The combination of gas and electric light in Saratoga is proving very popular. The American system of electric lighting is in use, and it is understood that the gas company is now contemplating a large increase of American apparatus.

—— Eight electric poles will be erected by the gas company, which recently purchased the plant of the Thomson-Houston Company at Santa Rosa, Cal. Most of the lights will be on Fourth street, and those around the plaza will be 60 feet high.

—— The Lewiston and Auburn (Maine) Electric Light Company is building a dam on the Androscoggin River, by which they will secure about 500 horse power. This power the company will use for lights and for operating electric motors.

—— Albert K. Gregory, Philip S. Swain and Robert Maitland, all residents of Brooklyn, are among the corporators and trustees of the Electric Light and Power Company, of New Brighton, S. I. incorporated at Albany on Monday with a capital of $10,000.

—— The Portsmouth Gas Company and the Norfolk Gas Company, of Virginia, have both recently concluded to go into the electric light business and have adopted the American system of electric lighting. President McElhenny, of Philadelphia, and Treasurer Marshall, of Portsmouth, were in New York last week, and closed a contract with the American Company for one hundred lights for the Portsmouth Company. The Norfolk Gas Company is to install two hundred lights.

—— The plant of the Cowles Electric Smelting and Aluminum Company, at Lockport, N. Y., is to be increased to just double its present capacity. The turbines now in use are two in number of 36 inches each. The new ones will be one 25-inch wheel and one 30-inch wheel, and, like the old ones, they will be made by the Stilwell & Bierce Company, of Dayton, O. The dynamo, which the Brush Company is now making, will be an exact duplicate of the former one, which is already familiar to the readers of this journal.

—— The report of the Middlesex Electric Light Company, of Lowell, Mass., shows that there are at this date 305 electric arc lights in use, ninety-one on poles in streets, and 214 in stores, offices and public buildings. The following statements show the condition of the company from its beginning: The net earnings for the year ending May 31, 1887, were $14,808.86, or 11¼ per cent. on the shares issued, and over 9¾ per cent. on the total capital stock. A dividend of 6 per cent. for the year has been declared and paid. The temporary loan account has been increased in the sum of $3,600 for improving the plant; also for the addition of an incandescent system of lighting, and power for running motors. There are over 100 incandescent lights now in use in stores and offices in the city of Lowell.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JUNE 14, 1887.

364,639 Galvanic battery; Victor Franckes, Liege, and Edouard Bender, Brussels, Belgium, assignors to the Leclanche Battery Company, N. Y.

364,656 Battery solution; William P. Kookogey, Brooklyn, N. Y.

364,660 Battery bell; Abraham V. Messerole, New York, N. Y., assignor to the River and Rail Electric Light Company, of West Virginia.

364,721 Cut-out block; Edward McEvoy, New York, N. Y.

364,760 Electric gas-lighter; Charles W. Holtzer, Brookline, Mass.

364,764 Electric burglar alarm; Geoffrey B. Lehy, Boston, Mass.

364,893 Synchronous telegraphy; Robert G. Brown, Brooklyn, assignor to the Standard Multiplex Telegraph Company, New York, N. Y.

364,894 Synchronous telegraphy; Robert G. Brown, Brooklyn, assignor to the Standard Multiplex Telegraph Company, New York, N. Y.

364,913 Micrometer gauge; Albert H. Emery, Stamford, Conn.

364,940 Low-water alarm for steam boilers; Wm. J. Rassler, Brooklyn, N. Y.

364,994 Terminal or distributing box; Frederick E. Degenhardt, Chicago, Ill.

365,023 Electric synchronizing apparatus for clocks; Alfred Ramel and William W. Dean, St. Louis, Mo., assignors of one-half to Paul Bakewell, same place.

BUSINESS NOTICE.

"In making the statements which follow we can verify each and all of them as facts. Mr. Edward P. Thompson, of Temple Court (7 Beekman St.,) New York, is a good man to bring your patent cases to, for he is thoroughly versed in all the ins and outs of a Patent Attorney's duties. The following are some of his qualifications: Graduate of Stevens Institute as Mechanical Engineer. For four years tutor of classes of young men in mathematics and experimental physics at Elizabeth, N. J. Served professionally as Electrician and Chemist in the Swan Electric Company of New York for two years. Because of past successes as a Patent Attorney at 13 Park Row, New York, was appointed, to succeed N.S. Keith, of the patent agency of the *Electrical World* and Associate Editor. N. S. Keith is known as the Translator and Reviser of Schellen's Treatise on "Dynamo Electric Machinery." Mr. Thompson for two years personally prepared and prosecuted all the patent business of *Electrical World's* Patent Agency, and is the author of a series of articles in said paper upon "Analytical and Systematic Method of Inventing," which were widely known and favorably received. Mr. Thompson is a member of American Institute of Electrical Engineers and American Society of Mechanical Engineers. He is author of the "Expansion of Polynomials," which the ablest mathematicians of the world universally commend." —*New York Observer*.

CYRUS EMERY,
CONTRACTOR FOR ELECTRIC LIGHTING.

Plants completely equipped and Lamps rented or sold on installment plan, at your option. Any system. Correspondence solicited.

Room 25, Illinois Bank Building, Chicago, Ill.

WANTED.
Electrical Instrument Makers.

Electrical Instrument Makers; first-class Electric Bell and Burglar Alarm men.

Apply with references, to
DETROIT ELECTRICAL WORKS,
Detroit, Mich.

WANTED.
SMALL DYNAMO ENGINES.

Send specifications giving size and space, lowest prices on quick running engines, 450 to 500 revolutions, 2 to 3 H. P., no dead centers, governor acted upon by live steam, to couple direct to shaft of Dynamo, complete with oilers, etc.

POST & COMPANY, Cincinnati, Ohio.

Electric Light Primer.

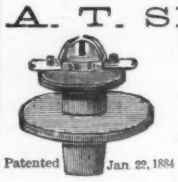
Facts connected with the Dynamo and Lights.

Precaution for safety.

A Science in simple language. Book for all, mailed free on receipt of price, 50 cents.

C. L. LEVEY, 61 Broadway, N. Y.

C. BAXTER,
Manufacturer of and Dealer in
Electrical Goods and Supplies,
40 FULTON ST., BROOKLYN, N. Y.

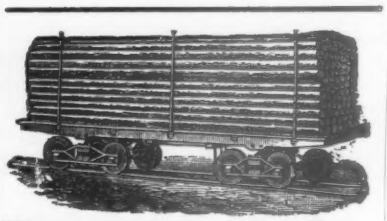
A. T. SMITH'S

Patented Jan. 22, 1884
NEW PAT'D. ELECTRIC LAVA GAS TIP,
The Cheapest and Best Burner in the market
For Multiple Lighting.
Send for prices to
A. T. SMITH,
6 West 14th St., New York.

MICA ALL SIZES AND QUALITIES
For Electrical Purposes.
EUGENE MUNSELL & CO.,
218 Water Street, New York.

SHEPARD'S $60. CELEBRATED
Screw-Cutting Foot Lathe.
CAP LATHE, $125.

Foot and Power Lathes, Drill Presses, Scrolls, Saw Attachments, Chucks, Mandreils, Twist Drills, Dogs, Calipers, &c. Send for catalogue of outfits for amateurs or artisans. Address,
H. L. SHEPARD, Agt.,
134 E. SECOND STREET, CINCINNATI, O.

BALDWIN & DAVISON,
SOLICITORS OF PATENTS,
193 Potter Building, 38 Park Row, New York.
In association with
BALDWIN, HOPKINS & PAYTON,
WASHINGTON, D. C.


Brownlee & Co.,
DETROIT, MICH.
DEALERS IN
Cedar Telegraph Poles
MANUFACTURERS OF
Cross Arms, Pins and Brackets,
OAK AND LOCUST PINS.
CEDAR TIES,
For Electric Railways.

Detroit Electrical Works
MANUFACTURERS OF
ELECTRIC SUPPLIES,
INCLUDING
Medical Batteries, Skeleton and Box Bells, Burglar Alarms, House Annunciators, Fire Alarm Boxes, Pins, and Brackets,
INSULATED MAGNET, TELEPHONE AND ELECTRIC LIGHT WIRE.
GENERAL OFFICES and FACTORY:
DETROIT, MICHIGAN.

PAINE & LADD.
HALBERT E. PAINE, Late Commissioner of Patents. | STORY B. LADD.
Attorneys in Patent Causes And Solicitors of Patents.
WASHINGTON, D.C.

WE GLADLY TESTIFY to the SUPERIORITY of the
MUNSON
Eagle and Dynamo Electric Light Belt.
The stretch, otherwise than the elasticity, is removed, no rivets and perfect evenness in heft, the result noiseless with a perfect motion, which is absolutely essential for a steady light. We use no other make. The character and responsibility of the house is unquestioned.

TESTIMONIALS.
Western Edison Light Co., H. WARD LEONARD, General Sup't.
W. J. Buckley, Mgr. Ft. Wayne Jenny El. Light Co.
Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office.
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building.
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago.
John Mab, Chief Engin'r of Board of Trade, Chic.
C. J. Meimes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
Wm. Oswald, Agt. Edison Light Co., New Orleans, La.

OFFICE AND FACTORY,
240 & 242 RANDOLPH ST., CHICAGO.

CARBONS
BOULTON CARBON CO.
FORMERLY
Boulton Standard Carbon Comp'y,
CLEVELAND, OHIO.
We do not brag about our Carbons, but we challenge the World to produce a better.

ALFRED F. MOORE,
Manufacturer of
Insulated Wire,
for Telephone, Telegraph and Electric Light.
OFFICE, LINE, AND
Annunciator Wire,
Magnet Wire, and Flexible Cordage,
200 & 202 N. THIRD ST.
PHILADELPHIA, PA.

CARBONS
FOR ARC LIGHTING.
Only Manufacturers using Natural Gas thus securing
Uniformity, Durability & Superior Light.
PITTSBURGH CARBON CO. (Lim'd,
PITTSBURGH, PA.

THE EMPIRE CITY ELECTRIC CO.,
779 Broadway, New York,
MANUFACTURERS OF
TELEPHONE, TELEGRAPH,
AND
ELECTRIC LIGHT SUPPLIES.
WRITE FOR PRICES.

GENUINE DISQUE CELL, COMPLETE.
The Porous Cell also bears Label.

THE ONLY GENUINE
LECLANCHÉ DISQUE BATTERY
IS THAT MADE BY
THE LECLANCHÉ BATTERY COMPANY.
Every Jar and Porous Cell bears the label and trade mark as shown in the cut.
All others are imitations.
DO NOT BE IMPOSED UPON.
IF DEALERS HAVE NOT THE GENUINE BATTERY. SEND DIRECT TO US FOR PRICE LIST.
None of the Imitations Compare with it in Efficiency.
THE LECLANCHÉ BATTERY CO.
149 W. 18th St., New York.

GENUINE DISQUE POROUS CELL.